

STRUCTURAL AGEING AND AUSTRALIAN CRIME TRENDS:

An Exploration of the Easterlin Hypothesis and the Nature of the Age-Crime Pattern

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B.A. (Hons.)

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Abstract

This thesis explores Richard Easterlin's theories regarding the association between structural ageing and crime, and its relation to the age-crime pattern, in a three-tiered analysis of Western Australian and South Australian apprehension trends.

Easterlin (1987a) proposes two expressions of an age structure-crime pattern: cohort density and age composition. The cohort density expression suggests that, in comparison to smaller birth cohorts, large birth cohorts will engage in higher levels of criminal activity because they experience higher levels of internal competition, and thus, relative disadvantage. The age composition expression suggests a concomitant decline in young persons' share of the population age structure and crime because, in comparison to older persons, young persons make a more sizeable contribution to a population's crime levels.

These arguments have not previously been investigated for Australia. Such analysis is appropriate, as official Australian crime statistics reflect the age-crime pattern (i.e. that individual offence levels peak around age 15-24 years and decline thereafter), and the population is ageing structurally.

Initially, the state of the age-crime pattern is assessed through distribution and correlation analysis. The findings indicate that the Australian age-crime pattern is diminishing; a decline in young persons' share of all apprehensions, and an upward shift in the age distribution of offenders, is unfolding more or less simultaneously with change in population share.

Cohort-specific departures from the age-crime pattern (i.e. whether or not the cohort has experienced declining apprehensions levels as it has aged, thus extending its participation in crime beyond the young crime-prone ages) are then identified by organising age-specific apprehension rates by birth cohort over time. Cohort analysis reveals that high cohort density is a potential source of variance in the age-crime pattern, and that departures from the age-crime pattern have been more sizeable (and

frequent) for the younger, larger 'baby bust' cohorts (the residential Australian population born 1968-74).

Finally, apprehension rates are standardised (and decomposed) for change in age structure, population size, and apprehension rates. These analyses show that structural ageing is constraining apprehension levels; its influence is generally greater than that of population growth, but lower than underlying change in apprehension levels which typically have the largest effect.

Overall, therefore, the thesis finds Easterlin's propositions to be supported, with Australian crime trends having been influenced by both cohort density and age composition effects. However, there are some differences across gender, offence categories, and period, suggesting that, like the underlying age-crime pattern, the association between structural ageing and crime is not rigidly invariant.

Acknowledgements

I wish to acknowledge the contribution that my two supervisors – Professor Natalie Jackson and Doctor Daphne Habibis – made to this thesis. Natalie first introduced me to demographic concepts and methods, which I found to be a refreshing and ‘real world’ approach to understanding social trends. It was indeed her suggestion I pursue the association between structural ageing and crime for my thesis. Daphne, on the other hand, sparked my interest in criminology as an undergraduate student, and suggested that I undertake an internship at the Australian Institute of Criminology, which proved very useful for finding and understanding Australian crime data collections.

I would also like to thank my parents for their unwavering support, without which I would not have been able to complete my postgraduate studies.

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FIGURE 12.4.1.2: MALE SOUTH AUSTRALIAN APPREHENSIONS, SEXUAL OFFENCES: DECOMPOSED RATIOS ('00), 1987-1997 AND 1998-2004. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 12.5.1.1: MALE SOUTH AUSTRALIAN APPREHENSIONS, ROBBERY AND EXTORTION: OBSERVED, AGE-, SIZE- AND APPREHENSION-STANDARDISED NUMBERS, 1987-1997 AND 1998-2004. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 12.5.1.2: MALE SOUTH AUSTRALIAN APPREHENSIONS, ROBBERY AND EXTORTION: DECOMPOSED RATIOS ('00), 1987-1997 AND 1998-2004. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 13.1.1.1: PROJECTED MALE SOUTH APPREHENSIONS (AT 2004 RATES): CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 13.1.2.1: PROJECTED FEMALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES): CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 13.2.1.1: PROJECTED MALE WESTERN AUSTRALIAN APPREHENSIONS (AT 2004 RATES): CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 13.2.2.1: PROJECTED FEMALE WESTERN AUSTRALIAN APPREHENSIONS (AT 2004 RATES): CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.1.1.1: PROJECTED MALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), OFFENCES AGAINST PROPERTY: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.1.2.1: PROJECTED FEMALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), OFFENCES AGAINST PROPERTY: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.2.1.1: PROJECTED MALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), OFFENCES AGAINST THE PERSON: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.2.2.1: PROJECTED FEMALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), OFFENCES AGAINST THE PERSON: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.3.1.1: PROJECTED MALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), FRAUD AND MISAPPROPRIATION: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.3.2.1: PROJECTED FEMALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), FRAUD AND MISAPPROPRIATION: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.4.1.1: PROJECTED MALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), SEXUAL OFFENCES: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE 14.5.1.1: PROJECTED MALE SOUTH AUSTRALIAN APPREHENSIONS (AT 2004 RATES), ROBBERY AND EXTORTION: CRUDE, AGE-WEIGHTED, AND SIZE-STANDARDISED NUMBERS, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.4.1: WESTERN AUSTRALIAN MALE BIRTH COHORT SIZE, BY AGE, 1971-2002. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.4.2: WESTERN AUSTRALIAN FEMALE BIRTH COHORT SIZE, BY AGE, 1971-2002. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.5.1: ANNUAL AGE COMPOSITION OF MALE SOUTH AUSTRALIAN POPULATION, 1987-1997 AND 1998-2004. ... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.5.2: ANNUAL CHANGE IN AGE COMPOSITION OF MALE SOUTH AUSTRALIAN POPULATION, 1987-1997 AND 1998-2004... .. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.5.3: ANNUAL AGE COMPOSITION OF FEMALE SOUTH AUSTRALIAN POPULATION, 1987-1997 AND 1998-2004. ... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.5.4: ANNUAL CHANGE IN AGE COMPOSITION OF FEMALE SOUTH AUSTRALIAN POPULATION, 1987-1997 AND 1998-2004. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.1: ANNUAL PROSPECTIVE AGE COMPOSITION OF MALE SOUTH AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.2: ANNUAL PROSPECTIVE CHANGE IN AGE COMPOSITION OF MALE SOUTH AUSTRALIAN POPULATION, 2004-2051..... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.3: ANNUAL PROSPECTIVE AGE COMPOSITION OF FEMALE SOUTH AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.4: ANNUAL PROSPECTIVE CHANGE IN AGE COMPOSITION OF FEMALE SOUTH AUSTRALIAN POPULATION, FEMALES, 2004-2051.... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.5: ANNUAL PROSPECTIVE AGE COMPOSITION OF MALE WESTERN AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.6: ANNUAL PROSPECTIVE CHANGE IN AGE COMPOSITION OF MALE WESTERN AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.7: ANNUAL PROSPECTIVE AGE COMPOSITION OF FEMALE WESTERN AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.6.8: ANNUAL PROSPECTIVE CHANGE IN AGE COMPOSITION OF FEMALE WESTERN AUSTRALIAN POPULATION, 2004-2051. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.1: MALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES: ANNOTATED FOR COHORTS AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.2: MALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES ('000): ANNOTATED FOR THE COHORT BORN 1969-72 AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002..... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.3: MALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES ('000): ANNOTATED FOR THE COHORT BORN 1973-76 AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002..... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.4: FEMALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES ('000): ANNOTATED FOR COHORTS AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002. **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.5: FEMALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES ('000): ANNOTATED FOR THE COHORT BORN 1969-72 AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002..... **ERROR! BOOKMARK NOT DEFINED.**

FIGURE B.7.6: FEMALE WESTERN AUSTRALIAN UNEMPLOYMENT RATES ('000): ANNOTATION FOR THE COHORT BORN 1973-76 AT AGE 16-19 AND 20-23 YEARS, AS A PERCENTAGE, 1978-2002. **ERROR! BOOKMARK NOT DEFINED.**

Chapter One – Introduction

Age is a ‘master variable of sociological theories of crime’ (Hirschi and Gottfredson 1983: 522), and one of the ‘most uncontroversial social indicators of crime’ (Findlay 1999: 63). Identification of the empirical association between age and crime dates back to the mid-1800s, when statistical analyses undertaken by Quetelet (1833) led him to conclude that age was stronger than any other force in shaping an individual’s criminal activity. In the mid-1900s, Glueck and Glueck (1937: 105) concluded that ‘aging is the only factor which emerges as significant in the reformatory process’. More recently, Hirschi and Gottfredson (1983: 522) suggested that the age distribution of offending has become the most ‘widely accepted’ feature of crime. Blumstein (2005: 244) refers to this apparent age-crime pattern as the trend of individual offending ‘starting at an early age, rising to a peak in the late teens, and then dropping rather slowly to almost zero at a late age’. The disproportionate level of criminal activity that is attributed to 15-24 year olds has come to be regarded as a core aspect of recorded crime (Braithwaite 1989). These statistics also suggest that individual offence levels increase prior to, and decline (slowly) subsequent to, this peak age (Mukherjee, Carcach and Higgins 1997: 189-90; Steffensmeier et al. 1989). Onset typically occurs around age 8-14 years, and desistance around age 20-29 years (Farrington 2003: 223-25; Laub and Sampson 2003: 16-17).

Despite the indisputable empirical evidence for such an age-crime pattern, there are possible anomalies to the general trends. Developmental (or life course) perspectives on crime consistently find that offending levels do not always decline with age, the age and speed of desistance varies across individuals, and individuals who offend at one age are at greater risk of offending at a subsequent age (Blumstein 2005: 244; Farrington 2003: 223-25; Laub and Sampson 2003: 16-17). More specifically, the age-crime pattern varies slightly across gender and offence type. Kerner (2005: 260) claims that females enter their peak offending period one age group earlier than the male peak offending age of 17-22 years, and they offend over a briefer period of time. Similarly, the offence that an individual is most likely to commit is dependent

on their age (Cline 1980). Fifteen and 16 year olds are most commonly apprehended for property offences, 17-21 year olds for person, robbery, and violent offences (including some sexual offences), and 21 and 22 year olds for fraud, and sexual offences. Further, the rate of desistance varies across offence type, typically occurring at its most accelerated rate for property offences, meaning that some offences will have an older age distribution of offenders than others (Cline 1980; Steffensmeier et al. 1989).

The social circumstances underlying criminal activity are also believed to change as the individual ages (Farrington 2003; and Sampson and Laub 2003; also summaries by Moberg 1953: 773-73; Gove 1985; Farrington 1986: 230-35; and Tittle 1988). In relation to adolescents, research has consistently demonstrated that weak attachment to school and poor educational outcomes, attendance at an educational facility (and/or residing in a neighbourhood) with high rates of student delinquency and offending, interaction with peers, risk-taking behaviour, divorce of parents, and low socio-economic backgrounds (income of parents) increase the risk of offending or anti-social behaviour. In contrast, the criminal choices of adults are more commonly shaped by involvement with life events – employment and partnering in particular – that shape their involvement with social structures and institutions. However, there is only a general consensus with regard to the age-graded social factors associated with criminal activity (and desistance). The actual nature of the relationships between these social factors and crime, and how they interact across the life course, is largely unknown.

In this regard, determining the causation of the association between age and crime has proved particularly challenging (Farrington 1986: 189-90). Hirschi and Gottfredson (1983: 522) go as far to say that ‘the meaning or implications of the relation between age and crime ... easily qualifies as the most difficult fact in the field’. Similarly, Laub and Sampson (2003: 17) remark ‘little is known about the age-crime relationship over the full life course’. This is partly because sociologists have focused on juvenile delinquency, which has inadvertently marginalised analysis of adult offending patterns, and subsequently limited opportunities to explore developmental and life course issues (i.e. life events and transitions) (Sampson and

Laub 1992; Horney, Osgood and Marshall 1995; Thornberry 1997: 2). Hence, Marvell and Moody (1991: 238) state that ‘the age/crime relationship is not backed by established theory’ but rather ‘speculative reasons’.

What research has been undertaken suggests the relationship between age and crime is far from straightforward. The highly contradictory and inconclusive findings emerging from the research, confounded by problems with criminal justice data (such as poorly organised data sources, and the gap between actual and detected crime levels, or the ‘dark figure of crime’), have contributed to the difficulty in developing a definitive profile of the age-crime pattern. One particular sociological debate that has arisen from this situation is whether the role and impact of age in relation to offending trends is one of variance or invariance. Greenberg (1977, 1983, 1985) and Hirschi and Gottfredson (1983; also Gottfredson and Hirschi 1990) have been particularly central in the debate, and their arguments continue to shape age-related research. Some of the issues of contention include whether the association between age and crime is dependent or independent of intervening variables (time, place, gender, ethnicity, and social conditions), whether it is consistent across different types of offences, and the appropriate methodologies and data sources for analysis.

The uncertain nature of the age-crime pattern has subsequently contributed to the demand for any crime-related theories and empirical analyses to contribute to the knowledge base pertaining to the age-crime pattern (Blumstein 2005: 245). An avenue that has not been extensively explored in this regard, despite its potential to make a significant contribution to explaining the contradictions of the age-crime pattern, is the possibility of demographic change confounding the association between age and measured crime (see O’Brien and Stockard 2009). This is surprising, as crime-related research has long been concerned with demographic trends in association with social and economic issues (Walker 1994: 22). Durkheim (1987/1951), for example, illustrated the usefulness of criminological and demographic data for understanding social issues, as did the Chicago School (see Short 1971), whose theorists analysed the interaction between population structure and deviant behaviour. Demographic phenomena have also been widely used in

predictive criminological research, being used to predict future rates of crime based on knowledge of offending patterns and the demographic profile of a given population (Farrington and Tarling 1985). As South and Messner (2000: 85) observe, ‘it is hardly an exaggeration to claim that much of the sociological theorizing in criminology represents an effort to account for the well-documented “demographic facts” about crime’.

The multiple linkages between crime and demography have resulted in this relationship having a central role in the development of many criminological theoretical perspectives and empirical models (South and Messner 2000: 84). These explore two primary types of interaction. One type examines how crime trends and deviant behaviour influence demographic behaviour and population structure. This approach focuses on the demographic concepts of fertility (and nuptiality), mortality, and migration (and residential mobility). The second type is concerned with the impact of demographic attributes and population structure on aggregate crime trends and patterns. Age, as well as gender and ethnicity, are the key variables of this particular interaction. It is this second form of interaction between crime and demography that is most likely to relate to the age-crime pattern, and to the associated variance/invariance debate. More specifically, with regard to age-transitional change, this second form of interaction relates to how changing population age structure may shape crime trends, or an age structure-crime pattern, at the aggregate level.

Regarded as the most useful demographic variable available (Foot 1998), population age structure (or age composition) refers to the proportion of persons at each age (or age group) in the population. The demographic transition sees levels of births and deaths fall from high to low, which concurrently leads to the population age structure shifting from ‘young’ to ‘old’ (Coale 1973; Teitelbaum 1975; Caldwell 1976; Jackson 2001). This shift is observable in the increasing proportion of the population that is old and, concomitantly, in the declining proportion that is young. While increasing life expectancy adds to the number of elderly in the population, the primary cause of this structural ageing is declining fertility. This trend delivers

declining numbers of babies into the population age structure, causing it to contract at its base and, hence, for the population to age structurally.

Additionally, the population age structure is shaped by the size of each birth cohort: ‘those persons born in the same time interval and aging together’ (Ryder 1965: 844). These birth cohorts vary in size: some are very large while others are smaller, which similarly influences the proportion of persons at different ages in the population age structure. If the ‘young’ age bracket is comprised of predominantly small birth cohorts, the total population will be older than a total population whose ‘young’ age bracket comprises of very large birth cohorts, and vice versa for the ‘older’ age brackets.

The varying size of birth cohorts also causes each birth cohort to experience a unique array of life chances: ‘Each new cohort makes fresh contact with the contemporary social heritage and carries the impress of the encounter through life ... [and so] each cohort is differentiated from all others’ (Ryder 1965: 844; Easterlin 1987a). The quality of life chances encountered by a birth cohort are thus relative to its size; the larger the cohort, the less promising its life chances may be.

One important argument that has potential to make a significant contribution to our understanding of the association between population age structure and crime (or at least known crime), and subsequently the nature of the age-crime pattern, is Richard Easterlin’s ‘relative income hypothesis’ (1987a). Easterlin holds that the contribution of population age structure to our understanding of fluctuations and cycles in human behaviour is frequently overlooked. His arguments represent an integration of economic and sociological perspectives, recognising the roles of both rational decision-making and institutional factors (see Pampel and Peters 1995, who provide a literature review of the application of Easterlin’s theories in the sociological field).

The Easterlin hypothesis (1987a) is concerned with the baby boom and bust following World War II in America – a period which saw birth rates and relative cohort size rise then fall, and the population age structurally – and how this relates to social change. Its basic premise is that large birth cohorts face greater competition and less promising life chances, resulting in reduced relative income, compared to

smaller birth cohorts. The resources of large cohorts are consequently unable to meet the aspirations concerning standards of living that were developed by the cohort in its formative years. This situation impacts on fertility rates, education and labour force experiences, and partnering and family choices. Easterlin anticipated that the increased stress levels that large birth cohorts may experience in these respects would, in turn, result in heightened levels of social disorganisation. This includes increased crime levels, which Menard and Elliot (1990: 241) believe clearly reflects the classical version of structural strain theory because it assumes an inability to meet material aspirations as a result of poor economic opportunity and achievement will result in an increased propensity for criminal activity.

Further, Easterlin (1987a) argues that change in population age structure impacts levels of age-related social behaviours (such as crime) in two ways. On the one hand, large birth cohorts may experience higher levels of the behaviour than small birth cohorts due to cohort density (internal competition). On the other hand, as the size of birth cohorts at each age group fluctuates, and the age composition of the population changes, so may the aggregate level of the age-related behaviour.

In this respect, the Easterlin hypothesis (1987a) presents an ideal framework for the investigation of the age structure-crime pattern. It provides very specific expectations of how apparent changes in social phenomena may be traced to variation in birth cohort size (and associated life circumstances) and age composition effects. Given Easterlin's reference to age-specific behaviour within these expectations, they appear to be particularly relevant to social events that are closely linked with age. Such an association is clearly evident in the foundation of the age-crime pattern: that a disproportionate level of crime is committed by young persons. Easterlin's proposition that population age structure will thereby impact on crime levels appears justified in this sense, and, if correct, would apply regardless of the impact of intervening variables such as criminal justice system responses. The other value of the Easterlin hypothesis is that the theory specifies certain life events that may be impacted by population age structure. One such life event is unemployment, which the criminological literature suggests is associated with offending patterns (although

the relationship is unclear), and can be tested empirically (albeit indirectly) due to the availability of unemployment data.

The theories and expectations of Easterlin (1987a) can be rephrased and integrated with the foundation of the age-crime pattern to express the anticipated association between age structure and crime as follows. First, fluctuations in age-specific offence levels may be observed as cohorts of varying size, which experience various degrees of internal competition, progress through their respective life cycles. Indeed, Easterlin believes that it is internal competition, and not size *per se*, that influences a cohort's offence levels; that is, fluctuation in the numbers of persons at a certain age alone does not lead to a fluctuation in age-specific ratios. A temporary rise and fall in the offence rates of 18-25 year olds, for example, may be evident as a large birth cohort facing high internal cohort density passes through this age group. Furthermore, the enduring impact of birth cohort-specific life chances (the poor unemployment rates they experienced when first seeking entry to the workforce, for example) may impact on the criminal choices of birth cohorts at all stages of their respective life course. The offence levels of large birth cohorts (who experience higher levels of disadvantage and stress) may be higher than anticipated at all stages of the life course or, more significantly, reflect a deviation from the age-crime pattern and increase as the birth cohort ages. In contrast, the offence levels of smaller birth cohorts, who, having faced lower levels of internal competition than their larger counterparts have not experienced substantial levels of disadvantage and stress, will be more reflective of the age-crime pattern.

Second, fluctuations in the total offence level of a population can be anticipated as young persons' share of the population age structure changes. This is because the age-crime pattern tells us that young persons, who have higher offence levels than their older counterparts, make the greatest contribution to a population's total prevalence of crime. If young persons' share of the population age structure is large, high total offence levels can be anticipated for the population. Alternatively, if young persons' share of the population age structure is small – as is the circumstance for a population that has aged structurally – lower total offence rates can be anticipated for the population.

There are, however, numerous limitations to Easterlin's (1987a) arguments. From a sociological perspective, there is minimal acknowledgement of broader social factors and cross-national differences. It is male-orientated, not allowing for the changing role of women in society, such as their entry into the workforce and how this may shape contributions to the family's economic wellbeing. That is, the theory ignores underlying change in sex roles, with males remaining the sole 'breadwinner'. Ethnic differences are similarly marginalised, the discussion of social disorganisation being restricted to Anglo-American males. This is important because ethnic birth cohorts differ in relative size within the total population. It is also possible that a proportion of a birth cohort may have spent their formative years (i.e. their childhood and teens) in their country of birth and not their country of residence. Similarly, expanding educational opportunities for all social groups have increased competition levels in this setting, regardless of birth cohort size, just as increasing levels of female employment have increased competition in the workforce. Nor are relationships conceptualised beyond marriage, excluding, for example, the possibility of 'pure' relationships and cohabitation. The impact of globalisation is also not considered; entering the lexicon during the 1980s, this concept has created new means and opportunities for offending due to the emergence of consumerism, advanced technologies, and a global market. Additionally, Easterlin's hypothesis can only be examined using age-specific data, which in the situation of crime can be difficult to obtain, and may in itself present a misleading portrayal of trends as age-specific data are restricted to known offenders, as opposed to all crime (the dark figure of crime referred to earlier). Although most of these factors cannot be accounted for in empirical investigation of the expectations, they need to be considered when drawing conclusions.

Similarly, from a demographic perspective, the baby boom cohort was born across significantly differing periods in different countries, spanning as few as five to seven years in some European countries against 19 years in the United States, Australia, and New Zealand (Teitelbaum and Winter 1985). It is important, therefore, that population data is annualised in order to determine which birth cohort is larger or

smaller. This oversight in particular affects Easterlin's hypothesis (1987a) because of the differing lengths of the baby boom in various countries.

Australia is one nation for which official statistics indicate that the age-crime pattern is applicable, that there are possible variations within the age-crime pattern, and that the population has undergone significant change in its population age structure in recent times.

In 2005-06, the Australian Institute of Criminology (AIC) indicate that the most commonly apprehended age group in Australia was 15-19 year olds (approximately 9,400 and 2,300 apprehensions per 100,000 of the respective male and female populations) (2008: 54-57). Individuals aged 25-plus years were the least likely to be apprehended (approximately 2,000 and 500 apprehensions for males and females). Apprehensions were more common for 20-24 year olds than 10-13 year olds.

These age trends are not consistent across offence types or time (suggesting that the Australian age-crime pattern is variant, and possibly being shaped by demographic change). Assault, motor vehicle theft, robbery, unlawful entry with intent, and other offences were most commonly committed by persons aged 15-19 years for the period 2002-03; sexual assaults were also most commonly associated with 15-19 year old males (AIC 2005: 55-71). Homicide, and fraud and deception-related offences, over the same period, however, were most commonly committed by persons aged 20-24 years. Further, offence rates declined across all groups between 2000 and 2003, but the trend is particularly evident in relation to persons aged 15-19 and 20-24 years (for whom rates have fallen dramatically) (AIC 2005: 55-71).

Some changes in the age distribution of offenders, by offence, can also be observed for the 1995-2003 period. In relation to homicide, for example, 15-19 year olds attracted the highest level of apprehensions for the period 1995-96, but by 2002-03, 20-24 year olds were the principal offenders. The opposite trend has occurred for sexual assault offences: 20-24 year olds were initially the main perpetrators of this offence, but more recently, it is 15-19 year olds who are being apprehended at the higher level. Similarly, although 15-19 year olds continue to be the age group

attracting the highest level of apprehensions for robbery, motor vehicle theft, and unlawful entry with intent, these offences are increasingly being committed by persons aged 20-24 years.

The Australian population has also aged structurally – to the extent that population ageing has become a ‘major concern’ for the nation (McDonald and Kippen 1999: 3) – and similarly experienced waves of differently sized birth cohorts. The emergence of structural ageing in Australia can be traced to the 1880s, but gathered momentum after the peak of the ‘baby boom’ in 1961 (Jackson 2001: 2-4, 15). Total fertility rates (TFR) peaked in 1961, with 3.6 births per woman, or 239,986 births in total. However, the subsequent progression of baby boomers through the life course resulted in an increase in the number of women reaching reproductive age; although the TFR had fallen to 2.9 births per woman by 1971, the actual number of births peaked at this time with 276,361 births. Therefore, the peak ‘baby bust’ cohort born 1971, and *not* the cohort born 1961, was (and continues to be) the largest in Australia’s history. Post–baby bust cohorts have all been smaller than their parental cohorts, but larger than the baby boom cohort. Thus, recent movements towards an ‘old’ population are caused primarily by the reduced fertility rates of the post–baby boom cohorts, particularly the large baby bust cohort, born in Australia between 1968 and 1974, and not the actual baby boom cohort born 1946-1965.

Recent projections indicate that the Australian population will continue to age structurally. By 2026, the proportion of the Australian population aged 65-plus years will have grown by around 90 per cent (Jackson 2007: 2). This compares to the 11 per cent growth that is projected for all other age groups combined.

These significant changes in the Australian population age structure, combined with the apparent age trends in apprehension statistics, suggest that the age structure-crime pattern is relevant for the nation. Despite this, the age structure-crime pattern has been largely unstudied in Australian research. This point is made by Weatherburn (2001: 2), who observes that ‘[o]ne frequently overlooked influence on long-term crime trends is the age structure of the population’. In particular, the impact of neither birth cohort density nor age composition has been investigated empirically as they relate to Australian crime trends.

Both of these aspects of the age structure-crime pattern (cohort density and age composition effects) have, however, been investigated empirically in the international sociological literature, mostly for the United States. These studies have produced mixed evidence in support of the phenomenon, particularly the anticipated association between birth cohort size and age-specific offence rates. However, it can be argued that weaknesses in some of the studies with regard to the application of concepts, theory, data sources, and method compromise the reliability of their findings. For example, some analysts profess to be analysing birth cohorts when they are in fact referring to the analysis of age groups ('true' cohort analysis is longitudinal and traces birth cohorts as they age). In this regard, the absence of investigation of the age structure-crime pattern in the Australian literature not only presents an ideal opportunity to examine whether Australian birth cohorts' own (age-specific) apprehension levels have declined as each cohort has aged, and the extent to which Australian apprehension levels have been contained (or not) by changing population age composition, but also to advance on these perceived limitations in the existing research.

In sum, the age-crime pattern informs us that offending is, primarily, a youth-orientated activity. The complexity of the association between age and crime, however, including its inconsistency across intervening variables and the range of social circumstances involved, has resulted in debate concerning the variant or invariant nature of the association. Further, the age distribution of offenders suggests that as the age structure of a population transforms, so too will crime trends. This may explain some of the contradictions emerging from the literature with regard to the age-crime pattern. The Easterlin hypothesis (1987a) provides a useful analytical framework, which is theoretically and empirically feasible, for examining the potential impact of birth cohort size on age-specific apprehension levels, and of age composition on total apprehension levels. These factors have not been explored in the Australian context, nor have their potential contributions to the variance/invariance debate. An investigation is timely, however, given that the nation's population has aged structurally and official statistics show clear evidence of the age-crime pattern.

The objective of this thesis, therefore, is to conduct an analysis that is informed by both the age-crime variance/invariance debate and the Easterlin hypothesis (1987a). Specifically, it seeks to determine the extent to which structural ageing has shaped (and may continue to influence) Australian apprehension trends with regard to the two expressions of the Easterlin hypothesis, by way of cohort and comparative analyses, and subsequently provide comment on the nature of the age-crime pattern.

It is not the purpose of this thesis to address the association between numerical ageing and crime. This particular aspect of population ageing is not experienced separately to structural ageing, but has different causes and implications that are technically important from a demographic perspective (Jackson 2004). Numerical ageing refers to the absolute increase in the number of elderly, and is caused by declining mortality or, more specifically, by increasing life expectancy at older ages (Jackson 2004, 2007). There are currently 2.6 million Australians aged 65-plus years, but based on Australian Bureau of Statistics (ABS) medium projections (in Jackson 2004), this number is expected to increase to 5.0 million by 2025, and 7.2 million by 2050. These demographic changes can be anticipated to drive an increase in crime against older persons. This may include an increase in victimisation levels, including abuse of older persons from family members and in aged care facilities, and a heightened susceptibility to financial fraud (James 2001).¹ Similarly, managing ageing prison populations, particularly in relation to physical and mental health needs, will be critical (see Dawes 2002a, 2002b; Dawes 2005; Dawes and Dawes 2003; Pool and Baxendine 2006).

Hence, the different demographic conceptualisations of the two dimensions of population ageing equate to a distinction in their association with crime. Whereas

¹ For further reading, see Barron, Cran, Flitcroft and McDermott (1990), Carcach, Graycar and Muscat (2001), Fattah and Sacco (1989), Grayson and Stein (1981), Hindelang, Gottfredson and Garolgo (1978), James (1992), James, Graycar, and Mayhew (2003), Kinnear and Graycar (1999), Kurrle, Sadler and Cameron (1992), McCallum, Matiasz and Graycar (1990), Muscat, James and Graycar (2002), Setterlund, Tilse and Wilson (1999), Skogan and Maxfield (1981), and Smith (1999, 2003).

numerical ageing will likely be associated with crime-related change against older persons (particularly an increase in victimisation levels due to their increasing numbers), structural ageing is associated with change in the perpetrators of crime – a proposed rise and fall in age-specific levels, and a decline in total levels – due to respective cohort density and age composition effects. In this respect, the numerical and structural dimensions of population ageing cannot be easily explored within a single analytical framework, and thus the focus in this thesis is on structural ageing and the age structure-crime pattern.

Nor does this thesis examine ethnic differences. This is an important avenue of investigation. The Aboriginal Australian population, for example, experiences both higher apprehension levels and a younger age structure than the national population, and could be expected to contribute to differences in apprehension rates between regional populations. Similarly, migrants may experience different life chances to those born in Australia because they have spent their formative years in their birth countries; migrant populations may also have different age structures to the national population. However, the impact of such factors on apprehension trends cannot be addressed here due to data limitations.

The investigation of the age structure-crime pattern in Australia will be undertaken in three stages. Each stage focuses on a different aspect of the association between population age structure and crime; accordingly, a different methodological approach is adopted for each stage.

Stage 1: I undertake a three-tiered examination of the age structure-crime pattern: (a) apprehension patterns, (b) the age-crime pattern, and (c) the age structure-crime pattern. Assessment of apprehension patterns involves examining the apprehension distribution of the total population over time, by offence, and calculating the contribution of the offence-specific apprehensions to total apprehensions as well as the change in apprehension share for these offences. Consideration of the age-crime pattern initially involves examining offence-specific apprehensions in relation to (a) the proportion of offences linked to younger persons as a proportion of the total population, and (b) the apprehension distribution specific to younger persons. The

strength of the relationship between change in the population age structure and change in apprehension trends is examined by (a) comparing age-specific change in population share (the size of each group as a proportion of the total population) relative to their apprehension share over the same periods, and (b) correlating these two sets of changes.

Stage 2: I undertake a three-tiered examination of birth cohorts, by sex, and their age-specific apprehension ratios: total apprehensions, offence-specific apprehensions, and cohort-specific apprehensions. The analytical technique for this aspect of the analysis is cohort analysis, and utilises an age-period-cohort nexus (the role of the three independent effects, and their interconnection, will become clearer as this thesis progresses). Age effects refer to crime at each age. Period effects refer to historical factors which may have influenced offence trends. A common period effect, such as a change in policing practices or willingness of victims to report crimes, may for example be indicated where all cohorts in the analysis are seen to deviate from the age-crime pattern at the same point in time. On the other hand, cohort effects would be evident where cohort-specific (individual cohort) apprehension ratios were seen to increase as the birth cohort ages. That is, birth cohorts extend their participation in crime beyond what accepted notions of age-crime trends would suggest. Such cohort effects could also be indicative of a period effect, but one that is applicable only to the specific birth cohort(s), for example the unemployment rates experienced by birth cohorts when first seeking entry to the labour market. Two cohorts are of particular interest for this aspect of the analysis (being those born 1969-72 and 1973-76) because they are both very large in size and experienced poor labour market conditions when first entering the workforce. They thus experienced relative states of disadvantage that would have influenced their broader life circumstances.

Stage 3: I investigate the retrospective and prospective impact of age composition effects on total male and female apprehensions, in relation to both overall and offence-specific apprehension levels. The analytical technique of this aspect of the analysis is comparative analysis, using a combination of standardisation and decomposition analysis. The retrospective analyses standardise actual numbers for

change in apprehension ratios, population size, and age composition, which is subsequently refined by decomposition (albeit for the former and latter indicators only). The prospective analysis calculates crude projected apprehension numbers, which are subsequently size-standardised to show the effect of change in population size, and age-weighted to show the effect of change in age composition. Each of these analyses thus indicate the degree to which total apprehension levels would have been either higher or lower had the comparative effect (that is, apprehensions, size, or age composition) not changed over time.

The thesis is structured as follows:

Chapters 2, 3, and 4 examine the literature in relation to crime and structural ageing. Chapter 2 discusses the nature of the age-crime pattern. Both sides of the original argument are discussed – Greenberg’s variant thesis (1977, 1983, 1985), and Hirschi and Gottfredson’s invariant thesis (1983) – and examples provided of how some of the broader themes of those arguments have been applied by others to ‘test’ these arguments. Although this thesis is not about the age-crime pattern *per se*, the relationship certainly underlies the age structure-crime pattern, and hence has important methodological and analytical implications for this thesis. Chapter 3 explains how offence levels can be expected to change in line with demographic change. The focus here is Easterlin’s hypothesis (1987a) concerning the association between birth cohort size and relative income, and its subsequent effect on crime. Both the classic (cohort density) and atypical (age composition) expressions of the hypothesis are outlined, which focus, respectively, on age-specific and overall trends. These expressions are subsequently respecified according to Australian population and age-crime trends, and the limitations and implications of the Easterlin hypothesis for the present analysis are discussed. Chapter 4 goes on to discuss the empirical evidence that various international studies have produced in support, or otherwise, of the two expressions of the age structure-crime pattern, again discussing the implications for the present analysis.

Chapters 5 and 6 outline the analytical techniques and associated data requirements for the quantitative analyses (the three stages outlined previously). Chapter 5

discusses the theories and objectives of correlation analysis, cohort analysis, and comparative analysis (standardisation and decomposition), and why they are appropriate for analysing the age structure-crime pattern. Chapter 6 focuses on data requirements for these analytical techniques, and is structured around the two streams of data required (population and age-specific apprehension data) and the identified variables (age, gender, state/territory, offence, and time). The discussion outlines the challenges of working with Australian criminal justice data, and how the limited resources have shaped the proposed course of analysis for this thesis.

Chapters 7 to 14 provide the results of the quantitative analyses. Chapter 7 focuses on the age structure-crime relationship (the first stage of the analysis outlined previously). Chapters 8, 9, and 10 focus on the cohort density expression of the age structure-crime pattern, or the classic expression of the Easterlin hypothesis, to determine whether large cohorts have experienced an extended participation in criminal activity beyond the (conceptual) age-crime pattern (the second stage of the analysis). The first of these chapters (Chapter 8) focuses on total apprehensions for each of five key birth cohorts considered. The second chapter (Chapter 9) compares five offence-specific apprehension levels for these same cohorts, while the final chapter (Chapter 10) focuses on the set of offence trends (total and offence-specific) for birth cohorts. Chapters 11, 12, 13, and 14 focus on the age composition expression of the age structure-crime pattern, or the atypical expression of the Easterlin hypothesis, to determine whether change in age composition has had a negative (i.e. reducing or containing) influence on total apprehension levels (the third stage of the analysis). The first two of these chapters discuss the results of the retrospective analysis. The initial chapter (Chapter 11) explores the impact of change in the three indicators over time in relation to total apprehension levels, while the subsequent chapter (Chapter 12) focuses on offence-specific apprehension levels. The two final chapters of the age composition analyses (Chapters 13 and 14) relate to the results of prospective analyses, and follow the format of the previous retrospective chapters.

Chapter 15 brings together the results for the quantitative analyses, drawing conclusions about the impact of population ageing on Australian crime trends,

support for the Easterlin hypothesis (1987a) and the nature of the age-crime pattern, and the limitations of this thesis.

Chapter Two – Sociological Arguments Concerning the Association between Age and Crime

The purpose of this chapter is to discuss interpretations of the age-crime pattern in the sociological literature and, in particular, arguments regarding the nature of the association between age and crime, in three stages. First, the core arguments of Greenberg's variant thesis (1977, 1983, 1985), and Hirschi and Gottfredson's invariant thesis (1983), are discussed. This is followed by an examination of some of the responses to these arguments, and, finally, by an illustration of how age-related criminological research has been applied to 'test' the variant or invariant association between age and crime.

2.1 The Foundations of the Arguments for a Variant or Invariant Association between Age and Crime

The emergence of discussion regarding the nature of the age-crime pattern in the sociological literature can be traced to Greenberg's (1977) article "Delinquency and the Age Structure of Society", as it was one of the first sociological works to explicitly focus on the association between age and crime. Hirschi and Gottfredson (1983: 563) later referred to it as the 'most prominent theory built explicitly on age'. The principal purpose of Greenberg's article was to highlight the shortfalls in sociological perspectives on delinquency. These arguments created a framework from which Greenberg (1983) subsequently determined that the age-crime pattern was variant, and had been inadequately addressed by sociology.

Greenberg (1977) argued that sociological theories of delinquency are unable to adequately explain the social significance of crime, particularly as it relates to the empirical association between age and criminal activity at all stages of the life course. Merton's (1957) anomie theory, for example, suggests that criminal activity

is a response to failure in meeting social expectations of success, and the motivational theories developed by Cloward and Ohlin (1960) and Cohen (1955) suggest that lower class youths' involvement in crime is a product of subculture normalisation. Greenberg's critique of these theories is that the timing of the reduction in criminal activity (desistance) is asymmetrical to the reduction in both anomie and subculture conformity. That is, the decline in the realisation of an inability to fulfil goals and opportunities, and hence success, occurs at a much slower pace than does the ageing out of participation in crime, just as juvenile subculture identification is abandoned more rapidly than offending.

Rather, Greenberg (1977: 213-14) makes the generalisation that 'any society that excluded juveniles from the world of adult work for any long periods and imposed mandatory attendance at schools organized [to meet the requirements of a capitalist economy] would have a substantial amount of delinquency'. Greenberg argues that delinquency may be more likely to arise out of declining levels of teenage employment. This trend minimises the likelihood of lifestyle choices to be funded and directly impacts on peer (subculture) involvement, the effects of which are further compounded by the lack of autonomy and reinforcement of scholastic and labour force failure experienced within educational settings (particularly for adolescents from a low socio-economic background). Hence, adolescents are more likely to fulfil their requirements illegitimately, and be willing to engage in risk-taking behaviour. Consequently, as opportunities for legitimate income increase with age, the motivation to engage in criminal activity will concomitantly decline.

Greenberg (1983: 32-33) subsequently develops his theory, drawing on sociological contributions to the field from Glaser (1978), and Friday and Hage (1976), arguing that:

the age distribution of crime [emerges from] the increasing separation of adolescents from adults in modern society, on the differences in the degree to which persons of various ages are integrated into conventional institutions, and on the character of their integration. Low integration in, and alienation from, these institutions can provide motives for violating the law ... [and] implies

weak socialization to standards of conventional society, as well as the weakness of informal methods of social control.

Greenberg (1983) points out that this explanation for the age-crime pattern does not adequately account for variations in the age profiles of offenders across offence types. If social integration and social control were the sole catalysts for the disproportionate level of crime attributed to young persons, all offences would have a homogenous age profile of offenders. As official crime statistics do not reflect such homogeneity, opportunity and/or motive must also be key players in the age-crime pattern (although the role of such factors is limited). Namely, opportunity would logistically be paramount for offences that can only be committed by an employee, and hence the likely age of such offenders would be pushed upwards. On the other hand, Greenberg does not perceive the variation in opportunity and motive between the offences of theft and assault to be adequate for these factors to account for variation in their respective offender age profiles. The concluding argument of Greenberg in this respect is, therefore, that the association between age and crime is variant, which is neither easily explained nor adequately explained by existing sociological frameworks.

The attention to the age-crime pattern following Greenberg's (1983) contribution, particularly the criticisms of sociological theory, led Hirschi and Gottfredson (1983) to provide a synthesis and critical comment of empirical, conceptual, and theoretical components of existing perspectives. In contrast to Greenberg (1977), however, Hirschi and Gottfredson's core argument is that the age-crime pattern is an invariant association.

At the core of the position taken by Hirschi and Gottfredson (1983) is that the empirical evidence suggests an invariant relationship between age and crime. Available data sources indicate that the age-crime curves for the United States in 1977, England in 1908, England and Wales in the 1840s and 1965, and Argentina in the 1960s indicate that age-crime trends have not changed over time and are consistent across countries (see, for example, United States Department of Justice 1979; McClintock and Avison 1968; and DeFleur 1970). Further, the age distribution of offenders can be replicated for males, females, and various ethnic groups (see for

example Wolfgang, Figlio and Sellin 1972), and is evident when other recognised crime-related variables are held constant. Self-report data also reveals the same peak age and rate of decline of offending for both property and person offences (see Elliott, Ageton and Huizinga 1978; and Tittle 1980). Therefore, Hirschi and Gottfredson concur with Blumstein and Cohen's (1979: 562) remark that 'while population arrest rates have changed in absolute magnitude over time ... the same pattern has persisted for the relative magnitudes of the different age groups'.

Following from their interpretation of official statistics, Hirschi and Gottfredson (1983) determine that the invariant and robust nature of the age-crime pattern nullifies any requirement to explain the association conceptually or theoretically – it may in fact be one that is impossible to explain. For example, the consistency of the age-crime pattern on so many levels suggests that it is not influenced by causal factors. Any observed variation in the age distribution of offenders is derived from individual differences in responses to social and cultural environments, and so is not differentiated by social attributes as is commonly expressed in age-related accounts of crime. In this regard, age-based theories portray a false plausibility. The principles they discuss are seemingly accurate, but this is due only to the strength of the association between age and crime (1983: 573):

[T]he very fact that gives such theories their plausibility also falsifies them. A ubiquitous relation falsifies explanations the moment they are advanced, and the ubiquity of the age relation to crime is phenomenal.

It is therefore the opinion of Hirschi and Gottfredson (1983) that age-based constructs of crime – at least at the time of their writing – are misleading, and unnecessarily increase the complexity of the so-called facts of crime. This is because such approaches emphasise variations in the age-crime pattern that Hirschi and Gottfredson clearly believe are non-existent, and so portray patterns that are not necessarily evident in official statistics. Hirschi and Gottfredson nominate the sociological theories of strain and social control, which explain crime as a means of acquiring otherwise unobtainable material and lifestyle standards, as examples of irrelevant theories for the investigation of the age-crime pattern. These same approaches are advocated by Greenberg as (potentially) useful for explaining the

age-crime pattern which, in Hirschi and Gottfredson's opinion, highlights his inappropriate stance of a variant age-crime pattern. Most notably, Hirschi and Gottfredson find that Greenberg over-emphasises the role of social control factors for desistance, particularly for persons over 25 years of age (and essentially 29-34 year olds), and peer and media consumption pressures that emerged in society well after an association between age and crime did.

The use of the criminal career concept, and associated ideas of age of onset and desistance, is similarly misleading or redundant in the context of the age distribution of offenders (Hirschi and Gottfredson 1983). Criminal career approaches differentiate between short-term offenders with low levels of criminal activity and long-term offenders with higher incidence levels, using age of onset and desistance to account for the commencement, peak, decline and closure of an offending period. Hirschi and Gottfredson believe that these concepts present an image of the age-crime pattern that conflicts with the empirical association between age and crime, and so creates an illusion of variance. For example, differences in the age of onset and desistance across offender groups commonly portrayed by the criminal career approach are not supported by official crime statistics; these differences are more representative of variations in the level of crime being committed (or at least coming to the attention of authorities) across offender groups when at the same age rather than variation in the age-crime pattern *per se*.

Life course approaches are similarly problematic, as these consider life events that are undoubtedly correlated with crime, but are not actual causes of the age effect (Hirschi and Gottfredson 1983: 580). That is, the age-crime pattern would exist regardless of events such as marriage and employment:

[T]he stability of the age effect across societies and demographic groups would not be expected were life-course factors responsible for an "apparent" age effect ... Age is correlated with beliefs and practices themselves correlated with crime ... but we believe that these correlates are not responsible for the age effect.

As life events are unable to ‘compete’ with the effect of age in accounting for crime, life course theories are plausible only in so far as the age at which individuals tend to experience the events these theories examine are generally concurrent with the age at which the individual also experiences an increase or decrease in offending. For example, the timing of marriage in an individual’s life is similar to the time they will commence their desistance from crime (at least at the time of Hirschi and Gottfredson's contribution).

As well as Hirschi and Gottfredson’s (1983) belief that age-based conceptual and theoretical accounts of crime are irrelevant and misleading due to the invariant empirical association between age and crime, they also regard criticisms of criminological theory as being unable to explain the association as unjustified. This is because the empirical association between age and crime is so robust that it does not require theoretical explanation. Rather, Hirschi and Gottfredson argue that theoretical perspectives should only be required to explain what they are intending to explain. In the example of ‘maturational reform’ (which is a component of control theory), because onset and desistance are regarded as equals in the theoretical context of criminology and the process has been unable to explain desistance, its explanations in relation to onset have been drawn into question (see Siegel and Senna 1981, for example). Hirschi and Gottfredson argue, however, that theory should only be expected to distinguish between offenders and non-offenders. Without adopting this type of perspective on the requirements of criminological theory, Hirschi and Gottfredson fear that it is at risk of eliminating the possibility that age is an independent variable operating regardless of intervening factors. Similarly, criminological theory would assume that the social factors contributing to crime are either limited to young people or age-graded, and not allow for the possibility that one factor may influence criminal choices at all stages of the life course.

Although Greenberg (1985) acknowledges the contribution of Hirschi and Gottfredson’s (1983) arguments to the knowledge base regarding the age-crime pattern, he contends their invariance argument in some respects. In particular, Greenberg does not believe that the age-crime pattern is consistent over time and

place, offences, and demographic groups, and that the interpretation of the nature of the association may be dependent on data organisation.

First, in relation to the various age-crime curves that Hirschi and Gottfredson (1983) present in relation to time and place, Greenberg (1985) argues that, at the time of writing, these indicate that the modal age of offending has declined but the rate of decline has increased. For example, a significant drop in the peak age of offending in England has occurred, from 20-25 years in 1842-44 to 14-17 years in 1968. Similarly, between 1933 and 1980, the peak age for offending in the United States fell from 19 to 18 years, the percentage of apprehensions attributed to persons under the age of 25 increased from 39 to 56 per cent, and the percentage of offences attributed to 35-39 year olds compared to 20-24 year olds fell from 70 per cent to 31 per cent. Hence, '[i]n the course of industrialization, the age distribution of crime has changed substantially' (1985: 13), and is indicative of a variant age-crime association as opposed to the invariant age-crime association promoted by Hirschi and Gottfredson.

Greenberg (1985) also argues that differences across demographic groups emerging from official statistics suggests variation in the age distribution of offending rather than differences in the level of crime as suggested by Hirschi and Gottfredson (1983). To illustrate this critique of Hirschi and Gottfredson's (1983) argument, Greenberg draws on research by Laub (1983; see also Wolfgang 1977). He found the offender ratios for each of males, females, Anglo-Americans and African-Americans, based on victims' estimations of the age of offenders, to reflect within group differences. In this regard, levels of criminal activity prior to age 17 years were indicated to be higher than subsequent to age 17 years. Additionally, females, Anglo-Americans, and urban residents desist from crime at an earlier age than males, African-Americans, and rural residents. FBI (1981, in Greenberg 1985) arrest data similarly indicates that of individuals under the age of 18 years, urban residents are more likely than rural residents to be arrested for person offences, but less likely to be arrested for property offences.

Finally, in relation to differences by offence, Greenberg (1985) contests that the arrest data used by Hirschi and Gottfredson (1983) to highlight the invariant nature of the age-crime pattern can be equally interpreted as indicative of the pattern being variant. That is, the data show the peak age of offending for violent offences is older than for offences against property, and that the 'ageing out' process is slower for the former than the latter.

These aspects of variance in the age-crime pattern are subsequently used by Greenberg (1985) to critique Hirschi and Gottfredson's (1983) argument that sociological concepts and theories cannot account for age effects because the age-crime pattern is invariant. Greenberg (1983) believes that the changes over time and place are suggestive of the age-crime pattern being due, at least in part, to social origins (such as the changing role of juveniles in society). This position is demonstrated by Rowe and Tittle (1977), for example, who found that controlling for the impact of social integration, moral commitment, fear of sanctions, and utility of the offence accounted for most of the association between age and crime.

A further aspect raised by Greenberg (1983, 1985) at this time is that not all cohorts' offending patterns appear to reflect the age-crime pattern. Hence, cohorts – 'a group of individuals who experience the same significant life event at about the same time' (Greenberg 1983: 31) – are a source of variation in the association between age and crime. This variation is attributed to cohort effects, a factor that has an enduring effect on the respective cohort following exposure to it at a vulnerable age. These effects subsequently have an impact on the age effects experienced by the cohort. For example, the age-specific offence trends of a cohort may be constant across its life course, which is in distinct contrast to the trend for individuals to desist from crime as they age. These cohort effects are often undetectable in cross-sectional analysis – which has contributed to Hirschi and Gottfredson's (1983) conclusion that the age-crime pattern is essentially invariant – but become apparent in longitudinal ('true' cohort) analyses.

To illustrate this point, Greenberg (1985) refers to male apprehension rates in the United States for 1970, 1975, and 1980 in relation to larceny. Cross-sectionally,

apprehension rates are seen to peak at age 15-19 years, and decline thereafter; in 1970, the apprehension rate for 25-29 year olds (11.88) was only one-third of the apprehension rate for 15-19 year olds (35.92). If, however, the apprehension rates of the cohort that was aged 15-19 years in 1970 are traced over its life course (hence analysing apprehension rates longitudinally), it is evident that their apprehension rate at age 25-29 years (21.56 in 1980) was two-thirds that of their apprehension rate at age 15-19 years (35.92).

A related issue is period effects (Greenberg 1983, 1985). These differ from cohort effects in that they are non-enduring, and so are influential for only a brief period of time (although Easterlin 1987a, whose theory is explored in the next chapter, would argue that period effects, in combination with age effects, result in cohort effects). Greenberg argues that period effects are more symptomatic of a grand social phenomenon such as a war or depression that has had a broader impact on the offender population (i.e. not restricted to one particular cohort). In this sense, Greenberg anticipates that period effects contribute to apparent variations in the age-crime pattern over time, but not to the extent of cohort effects.

Despite Greenberg's (1985) critiques, and numerous other opposing arguments to be discussed in the following section, Gottfredson and Hirschi (1990) maintained their stance that the age-crime pattern is not variant on any level in their subsequent work *A General Theory of Crime*. They do, however, concede that:

we may find conditions in which age does not have as strong an effect as usual ... [but] this does not lead to the conclusion that age effects may be accounted for by such conditions. [Rather] it leads to the conclusion that in particular cases the age effect may be to some extent obscured by countervailing crime factors (1990: 128).

In the example of cohorts, which Greenberg (1983, 1985) believes may be a source of variance in the age-crime pattern, could, from Gottfredson and Hirschi's perspective, be regarded as a 'case' in which age effects are not as strong as normal. Greenberg's arguments here relate to cohorts in general (i.e. an offender or prison cohort, and not simply birth cohorts) and, incidentally, are more concerned with

changes in age-specific trends over time than in tracing the offending patterns of a birth cohort as it has aged. Nonetheless, his arguments – and their potential association with Gottfredson and Hirschi’s above statement – are very important for this thesis (in particular the investigation of the classic expression of the Easterlin hypothesis, which focuses on the impact of cohort density, and will be explained further in the following chapter). That is, the arguments raise the possibility of demographic change (structural ageing, for example) being a source of change in age-crime trends, which may, or may not, subsequently lead this demographic change to be regarded as a source of variance in the age-crime pattern.

2.2 Responses to the Arguments

The previous section demonstrated that there are two distinct interpretations of the age-crime pattern, with Greenberg arguing that the association is variant, and Hirschi and Gottfredson that the association is invariant. Following the development of these interpretations, numerous researchers made subsequent contributions to the theoretical debate concerning the nature of the age-crime pattern.

Like Greenberg, Farrington (1986) argues that the association between age and crime is predominantly one of variance. He believes that Hirschi and Gottfredson’s (1983) assertion of an invariant association between age and crime is ‘controversial’ and ‘provocative’ (1986: 190). At the same time, Farrington (1986: 194) acknowledges that Hirschi and Gottfredson’s conclusion that the relation between age and crime is invariant is not ‘too implausible’ due to the ‘superficial’ differences in the age-crime pattern over time and place, demographic groups, offences, and peak age. Although writing from a strictly criminological perspective, Farrington provides some important insights into the empirical nature of the age-crime dynamic.¹ These relate

¹ Hirschi and Gottfredson’s (1983) arguments are further opposed by Farrington in a subsequent collaboration with Blumstein and Cohen (1988a). These challenges are not discussed in detail here as they relate to individual age-crime curves rather than the aggregate age-crime curve that is more relevant for this particular study.

to changes in age-crime curves over time and place, gender, and offence, and the possible role of life events in shaping individual criminal choices.

Ten aggregate age-crime curves produced by Farrington (1986: 198), relating to England for 1938, 1961 and 1983 (by gender) and the United States for 1983 (by gender, and violent and non-violent offences), indicate that “it would be difficult to conclude that the relation between age and crime was invariant”. The peak age of offending varies between 13 and 20 years in these curves, the mean age between 23 and 31 years, and the median age 20 to 29 years. Further illustrating the difference in age-specific offending patterns between males and females, the English age-crime curve for 1983 indicates a higher mean age of offending for females than males (26.3 years compared to 24.9 years). Fifty per cent of the female offenders were aged between 15-34 years, but the equivalent age range for males was 16-29 years. Furthermore, in the United States, the peak age of offending for non-violent offences (including burglary, larceny-theft, and motor vehicle theft) is slightly younger for females than males, and vice versa for violent offences (such as aggravated assault, forcible rape, and murder).

Farrington (1986) advances his argument that age effects vary by offence using Cline (1980) and Wilson and Herrnstein's (1985) studies. Cline categorised offences from 1977 FBI data as being either an ‘adolescent’, ‘young adulthood’, or ‘middle age’ offence; motor vehicle theft, burglary, and larceny theft are adolescent offences, while stolen property, sexual (except forcible rape and prostitution) and white collar offences are young adult offences, and alcohol-related offences are middle-aged offences. Also using FBI data (in this instance for 1980), Wilson and Herrnstein found that the most commonly committed offences changed across the life course. Offences such as fraud are committed at an increasingly greater level as the individual ages, being the seventh most common offence at age 40-plus years compared to the nineteenth most common offence for under-18 year olds. In contrast, declining involvement in burglary (declining from third to thirteenth), robbery (from eleventh to twenty-first), motor vehicle theft (from ninth to twenty-second), and vandalism (from sixth to fifteenth) occurs with age.

Farrington (1986) believes that periods of maximum change are one of the more interesting features emerging from the aggregate age-crime curves. The majority of increase in offences rates occurs prior to age 14 or 15 years (for England and the United States respectively), and the majority of decline subsequently occurs prior to age 19 years. Very little change occurs after 30 years of age. These periods of acceleration and deceleration are, according to Farrington, indicating the timing of life events that significantly shape criminal choices, which, from a theoretical perspective, is more important than the actual peak age of offending.

Further to this discussion, Farrington (1986) argues that Hirschi and Gottfredson's (1993) disregard of individual age-crime curves has contributed to their conclusion that the age-crime pattern is invariant. Unlike aggregate age-crime curves, individual age-crime curves are useful for understanding rates of prevalence and incidence (the number of different persons involved in criminal activity, and individual levels of crime, respectively). As peaks in prevalence are generally seen to be concomitant with peaks in age-specific offence rates, but incidence levels are consistent across the life course, the individual age-crime curves cannot be expected to reflect the same age-crime pattern as aggregate age-crime curves.

Emerging from this evidence for a variant association between age and crime is Farrington's (1986) belief that the causes of crime cannot be assumed to be the same at all ages. He argues that age is not a causal factor of crime *per se*, as age is a characteristic that cannot be manipulated. Rather, Farrington (1986: 229) believes that '[i]t seems more likely that age measures an underlying theoretical construct that causes crime'. That is, the association between age and crime is derived from age-related changes that are associated with crime. As these changes occur at different stages of the life course, it would follow that the underlying cause(s) of the age-crime pattern will not be the same at all ages. Marriage, for example, is regarded as a causal factor of desistance, but is only relevant for persons of marriageable age. Similarly, the interaction between socio-economic status and age alters over the life course; juvenile offending (or not) is associated with parental employment status, while adult offending is more directly related to one's own employment status (see Thornberry and Farnworth 1982; Glaser and Rice 1959).

Analytically, the age-crime pattern should be investigated from a variant perspective to complement the theoretical variance of the association. Therefore, in contrast to Hirschi and Gottfredson's (1983) invariant argument, longitudinal research should play a central role in advancing the knowledge base regarding the age-crime pattern. In particular, Farrington (1986) suggests that multiple cohort (longitudinal) analyses would assist in illustrating the nuances in the age-crime pattern, including the strength of its association with crime-related variables such as unemployment. This point will be explained further in Chapters 3 and 5, but alludes to the possibility of using 'true' cohort analysis to explore the age structure-crime pattern and, subsequently, comment on the nature of the age-crime pattern.

Following a two-tiered analysis of the age-crime pattern in the United States, sociologists Steffensmeier, Allan, Harer, and Streifel (1989: 826) similarly 'reject the hypothesis that the age distribution of crime is invariant across offence types and over time ... there is not a single age pattern'. The first level of their investigation is a cross-sectional analysis of offence types in 1980.² Overall, the median age of offending in 1980 was 25 years. Twenty-five per cent of individuals had been apprehended by the time they were 19 years of age, and 25 per cent post-37 years of age. Young offenders were involved in property offences (burglary, motor vehicle theft, vandalism, larceny, and stolen property) and robbery offences more than offences against the person (assault and homicide), fraud and misappropriation (fraud, forgery, and embezzlement), and sexual offences. Offence-specific median ages ranged between 18 years (burglary, motor vehicle theft, and vandalism) and 30 years (fraud). An index of dissimilarity further demonstrated a variant age-crime pattern (reflecting the similarity and difference between the age distributions of the criterion crime of burglary and offence of interest), producing a *D*-value as high as 51.8 for fraud (a *D*-value of 100 would indicate complete dissimilarity).

² With the exception of the overall range of median offence-specific ages, results from Steffensmeier et al.'s (1989) investigation are restricted (and regrouped) in its discussion here to offence types included in this thesis's investigation of the age structure-crime pattern.

The second level of Steffensmeier et al.'s (1989) investigation – a longitudinal analysis of the age distribution of offending between 1940 and 1980 – determined that the peak age of (total) offending had declined three years (from 22 in 1940, to 18 in 1980). For specific offences, the decline was as much as five years (for stolen property, forgery, and homicide), but as little as one year (burglary). Only the peak age of offending for fraud was constant across the analysis (at 24 years). Similar trends were evident for median and mean age, albeit at a greater level of change. Accordingly, the process of 'ageing out' of crime had accelerated. In 1940, a 50 per cent reduction from the peak age of total apprehensions had occurred by age 42 years; by 1960 it had increased to 49 years, but by 1980 had dropped significantly to 28 years. The same measure also indicated change in the 'ageing out' process for specific offences, but at a lower level. The index of dissimilarity and χ^2 test (also a measure of similarity and difference that compares the age distributions of burglary to the offence of interest) also indicated a variant age-crime pattern, which would be evident if *D*-values were at least 15 and χ^2 values less than 0.05. This combination was shown for all property offences as well as robbery, with *D*-values ranging between 21.1 (motor vehicle theft) and 31.8 (stolen property) and a χ^2 value of 0.00 across all such offences. Age distributions for offences against the person, fraud and misappropriation, and sexual offences have changed to a lesser degree; despite very significant χ^2 values, a significant *D*-value was calculated for only two of these offences.

Tittle and Grasmick's (1998) approach to the nature of the age-crime pattern is to assess three hypotheses emerging from the variance/invariance debate. These hypotheses are that the age-crime pattern is invariant, that social science variables are unable to explain the association between age and crime, and that age does not interact with correlates and causes of crime. The analysis of these hypotheses in relation to individuals aged 18 years and over in the United States, for the five years preceding the investigation, leads Tittle and Grasmick to conclude (in contrast to previous arguments) that the association between age and crime is equally variant and invariant.

The first hypothesis was examined by visual inspection of offence-specific age curves. Tittle and Grasmick (1998) determine that there are insignificant differences between the age-crime curves for minor theft, major theft, use of force, and fraud. Specifically, offence levels peaked prior to age 25 years. However, the age-crime curve for tax fraud indicated that it was essentially an offence of ‘middle age’. Therefore, Tittle and Grasmick (1998: 34) conclude that the age-crime pattern ‘is not “invariant” though it is highly generalizable’, being very similar in most respects but not homogenous.

The second hypothesis was examined with regard to the strength of ten control variables for explaining differences in (total and offence-specific) age-specific offence trends (Tittle and Grasmick 1998). The control variables, which encompass a range of theoretical perspectives, were low self-control, opportunity, community integration (including a measure of employment), interpersonal integration, religiosity, stress, dissatisfaction with personal conditions, self-esteem, gender, and ethnicity. In relation to total offence levels, levels of religiosity and self-esteem were found to increase with age, whereas stress and dissatisfaction declined with age. Low self-control was greatest prior to age 25 years, gradually declining to its lowest level at age 45-54 years (a difference that Tittle and Grasmick attribute to generational effect such as the disparate impact of world wars, a concept that will be examined in the next chapter when the Easterlin hypothesis is discussed). Opportunity levels are very similar across age groups. Community integration was negligible at most ages, but low for persons aged over 65 years. Similarly, interpersonal integration was high only for persons aged over 75 years. However, none of the control variables were found to influence the age-crime pattern in relation to specific offences; their combined impact was influential for only major theft, force, and tax cheating.

Therefore, the inexplicability hypothesis was neither supported nor negated; some socially grounded variables contribute (to some extent) to age effects at the aggregate level, but this was not evident by offence. In this regard Tittle and Grasmick (1998: 34) note that the complexities of their findings ‘verify how difficult it is to account for age-crime associations ... [which] do not easily yield to explanation’.

Additionally, this aspect of the analyses suggests that the age-crime pattern may be variant at the aggregate level, but invariant at the disaggregate level.

The third hypothesis was mostly supported by Tittle and Grasmick's (1998) findings. Using the same variables and offence-types outlined previously, no interaction between correlates and causes of crime was indicated for major theft or force. In contrast, stress was found to interact with minor theft, and interpersonal integration with fraud, while opportunity was also found to interact with tax cheat only as a correlate of crime. For each of these identified interactions, the effect of the variable on the respective offence declined with age. These findings also suggest that the age-crime pattern is generally invariant; there are differences between which correlates interact with crime, but there is no age-related differentiation.

Britt (1992) also presents evidence for both a variant and invariant association between age and crime. Parametric invariance requires all age distributions of offenders to be consistent over time and offence. Mathematical form invariance (which Britt believes is the foundation of Hirschi and Gottfredson's 1993 arguments) require all age distributions of offenders to be estimated from a single mathematical function that will differ only in relation to parameter values. On the one hand, Britt determined that the mean age of offenders between 1952 and 1987 had increased for rape, decreased for homicide and aggravated assault, but been stable for property offences, indicating the age-crime pattern to be variant. On the other hand, gamma and lognormal parameter estimates were similar for all but homicide and aggravated assault, suggesting that the pattern is essentially invariant.

2.3 Application of Arguments Concerning the Association between Age and Crime

More recent considerations of the age-crime pattern have focused on specific arguments emerging from the variance/invariance debate rather than forming generalised interpretations of its nature (as per the studies outlined previously).

Developmental criminology is one body of research that has grown in response to the variance/invariance debate despite Hirschi and Gottfredson's (1983) perception of it as a problematic approach to the age-crime pattern.³ This approach is concerned with individual offending patterns across the life course (both within and between individuals), including age-graded risk factors, life events, and transitions, and whether their influences are immediate or enduring (Nagin, Farrington and Moffitt 1995: 111; Farrington 2003: 221). This means that life events such as (un)employment need not influence every offender's criminal choices in the same way.

The majority of developmental criminology research has been conducted within a strictly criminological framework. However, two of the most influential works in the area are also sociologically informed. These are Sampson and Laub's (1993) *Crime in the Making: Pathways and Turning Points Through the Life Course*, and its follow-up, *Shared Beginnings, Divergent Lives: Delinquent Boys to Age 70* (Laub and Sampson 2003).⁴ Sampson and Laub's objective was to investigate the under-researched role of age-specific transitions and trajectories as turning points for offence patterns. Therefore, by looking beyond sociology's common focus on juvenile offenders (the core of Greenberg's critiques of crime-related sociological perspectives), Sampson and Laub seek to determine whether criminal activity across the life course is simply a continuation from childhood to adulthood offending, or behaviour that emerges from an age-specific event (such as educational outcomes during childhood, or employment during adulthood).

³ See Gottfredson (2005) for a discussion of how developmental criminology has contributed to understandings of age effects.

⁴ For further discussion regarding the impact of marriage see Sampson and Laub (1990, 1992, 1997, 2003, 2005a, 2005b), Laub and Sampson (1993, 2001), and Laub, Nagin and Sampson (1998). Other empirical studies relating to developmental criminology that have been developed from the ideas of Hirschi and Gottfredson include Blumstein, Cohen and Farrington (1988), Nagin and Farrington (1992a, 1992b), Nagin, Farrington and Moffitt (1995), Nagin and Land (1993), and Bartusch et al. (1997). For further reading on theoretical perspectives, see Moffitt (1993, 1997), Thornberry (1997), and Farrington (2003).

These objectives are explored within a framework that combines the principles of social control theory – namely Coleman’s (1988) conceptualisation of social capital – with the life course perspectives of Elder (1974, 1975, 1985 and 1992). They describe this framework as one which ‘incorporate[s] both stability and change over the life-course ... [portraying] the importance of informal social ties and bonds to society at all ages’ (Sampson and Laub 1993: 7, 17). Social ties, conceptualised as a mechanism for ‘creat[ing] interdependent systems of obligation and restraint that impose significant costs for translating criminal propensities into action’ (1993: 141), are closely associated with age-graded social control institutions such as marriage and work. If an individual does not have a high level of social investment or social capital in such an institution, they are more likely to offend. By illustration, the life event of unemployment creates a distance between the individual and society. An unemployed individual can therefore be expected to have a greater propensity to offend due to the weakening of social ties and social control they may otherwise have developed through paid work.

Sampson and Laub’s earlier work (1993) reanalyses Glueck and Glueck’s (1968) groundbreaking three-stage longitudinal data collection, commencing in 1940, of the offending patterns of delinquent and non-delinquent American males at approximate ages 14, 25 and 32 years. They found that despite between-individual stability in offending patterns across demographic variables such as age, ethnicity, and socio-economic status, adult social bonds play a significant role in adult offending regardless of childhood criminal involvement.

Job stability is an example of this trend, with both delinquent and non-delinquent adult males indicating a greater likelihood of apprehension (particularly at age 25-32 years) if they experienced low job stability (the importance of this finding for this thesis will be explored further in the next chapter) (Sampson and Laub 1993). For delinquent males experiencing low job stability at age 17-25 years, 91 per cent were apprehended at the same age and 74 per cent were subsequently apprehended at age 25-32 years (suggesting that low job stability has an enduring effect on offending); it was also a greater predictor of apprehension frequency at age 25-32 years than 17-25 years. Job stability at 25-32 years was also found to be significant for the delinquent

group. At the respective ages of 25-32 and 32-45 years, 80 and 64 per cent of males with low-level job stability were arrested, compared with 44 and 48 per cent of those with medium-level job stability and 18 and 39 per cent with high-level job stability. In contrast, apprehension levels were somewhat lower at age 17-25 and 25-32 year olds if medium or high job stability were experienced at age 17-25 years; 62 and 47 per cent of males with medium job stability were apprehended at these respective ages, compared with 60 and 32 per cent of males with high job stability. These trends were generally consistent with those of the non-delinquent group. However, the strength of the association between unemployment and apprehension trends was twice as strong for this group at age 25-32 years, and five times stronger at age 32-45 years; the impact of experiencing low job stability at age 17-25 years was also similar on their immediate and future apprehension trends.

Sampson and Laub (1993: 147) conclude that job stability ‘significantly modifies trajectories of crime and deviance’ regardless of prior involvement in criminal activity. Therefore, informal social capital, and the associated creation (or otherwise) of social ties between adults and institutions such as the labour market, has a direct impact on adult offending patterns. This finding is consistent with Greenberg’s (1977, 1983) suggestion that social control is an integral element of the age-crime pattern, and appears to override Hirschi and Gottfredson’s (1983) suggestion that sociological theories cannot account for the association.

Subsequent life history interviews by Laub and Sampson (2003) with 52 members of the delinquent group from Glueck and Glueck’s (1968) data set, now aged approximately 70 years, similarly found adult social bonds to play a significant role in creating turning points for within-individual offending trajectories, while agency was found to play a greater role than previously acknowledged. More importantly, the qualitative data suggests that interpretations of the association between age and crime as either variant or invariant may be dependent on the type of data consulted; variance in peak age of offending and the age of desistance at the individual level, but similarities in age-specific offending patterns at the group level, were equally shown. This finding concurs with Farrington’s (1986) argument that individual age-crime curves are more likely to reflect variance than aggregate age-crime curves, as

well as Hirschi and Gottfredson's (1983) argument that life course perspectives emphasise variations in age-specific trends that would have occurred regardless of life events.

The findings emerging across these two studies lead Sampson and Laub (2005a) to conclude that the age-crime pattern is variant in some respects (primarily at the individual level), but is essentially an invariant association as Hirschi and Gottfredson (1983) promoted. Turning points play a significant role in shaping the criminal choices of individuals, and indicate some age-differentiation (as evident in their 1993 analysis of job stability), but generally influence individuals in the same way regardless of criminal history, demographic attributes, and intervening factors. Thus, 'persistent offending and desistance from crime can be explained by a general age-graded theory of informal social control, that emphasizes social ties, routine activities and human agency' (Sampson and Laub 2005a: 41).

More recently, O'Brien and Stockard (2009) examine Hirschi and Gottfredson's (1983) invariant thesis via an assessment of the role of cohort replacement in the rise in young homicide offenders in the United States between the late-1980s and mid-1990s. They explore this question using an estimable function approach, calculating the contribution of age, period, and cohort effects to variance in the age-crime curve of homicide arrest rates. They find that each of these effects makes a statistically significant contribution to variation in the age-crime curve for homicide. Age effects, however, make a much greater contribution than period or cohort effects (83 per cent, compared to 12 per cent and four per cent respectively). This finding indicates that Hirschi and Gottfredson (1983) were correct in arguing that the age-crime pattern is invariant, although the apparent influence of period and cohort effects also suggests that it is not 'rigidly invariant'.

This conclusion is further supported by the powerful interaction between cohort replacement and period that emerges when the three effects are considered within a combined age-period-cohort model (O'Brien and Stockard 2009). Seventy-seven per cent of the difference between the observed age-period-specific homicide rates and the standard age-crime curve is attributed to cohort replacement. At the height of

homicide offences accounted for by 15-24 year olds in the United States in 1990, the age-period-cohort model accounts for all variation between the standard and observed age-crime curves. Subsequently, in 1995 the effects account for 60 per cent of the difference for 15-19 year olds, and 74 per cent of the difference for 20-24 year olds. Over both of these periods, observed rates for 15-19 year olds were seen to deviate from the standard age-crime curve more than the observed rates of 20-24 year olds. Nevertheless, cohort replacement explains only a little less than half of the gap between observed and standard age-crime curves for 1990 and 1995, which strongly suggests that the domination of the crack cocaine market at this time was also a significant (period) factor in the 'epidemic of youth homicide'. By 2005, O'Brien and Stockard (2009) note a 'mini' cohort effect. This is evident in the departure of the age-specific arrest rates for 25-29 and 30-34 year olds from the standard age-crime curve (higher than anticipated rates for the individuals who would have been young during the period of rising young homicide rates). With regard to specific cohort effects, a one per cent change in relative cohort size and the percentage of non-marital births is concomitant with a respective 1.11 and 1.34 per cent change in the age-period-specific homicide rates.

The findings from the age-period-cohort model lead O'Brien and Stockard (2009) to conclude that cohort replacement is a significant source of variation for the age distribution of homicide offenders. Although this would appear to support Greenberg's (1983, 1985) suggestion that cohorts are a potential source of variance to the age-crime pattern, O'Brien and Stockard argue that the association between age and crime pattern is invariant. This is because the age-crime curve is seen to be relatively constant over time once the influence of these effects has been accounted for. Again, therefore, this demonstrates how the nature of the age-crime pattern is open to interpretation; indeed, in an earlier analysis, O'Brien, Stockard and Isaacson (1999, discussed in greater detail in Chapter 4) concluded that the impact of cohort characteristics on homicide rates could be interpreted as either supporting or negating Hirschi and Gottfredson's (1983) invariance thesis.

2.4 Summary and Conclusions

While there appears little doubt that an age-crime pattern exists and that it is very robust, the actual nature of the association (that is, whether it is variant or invariant) remains unclear and widely contested. There are many layers to the original arguments concerning the variance or invariance of the association, which continue to be central to age-related analyses of crime. The subsequent contributions to the subject, be they direct responses to Greenberg or Hirschi and Gottfredson, or broader applications of their arguments, are yet to clarify whether the age-crime pattern is variant or invariant. In fact, the nature of the age-crime pattern may be even more complex than either Greenberg or Hirschi and Gottfredson anticipated, as it appears there may be some validity to both theses. This is also suggested by Blumstein (2005: 246), who acknowledges ‘the desirability of pursuing both directions until we find some optimum mixture’. Indeed, the interpretation of official crime statistics, the type and level of data consulted, and areas of interest all appear to influence how the association between age and crime is perceived.

It is not intended in this thesis to explore all of the complexities of the variant and invariant theses developed by Greenberg and Hirschi and Gottfredson (this thesis being more concerned with the age structure-crime pattern). However, the arguments that their theories raise, and the subsequent studies of the variance/invariance debate, demonstrate the need for this thesis’s investigation of the age structure-crime pattern to be constructed – and, subsequently, interpreted – in a manner that allows for either (or both) a variant or invariant association between age and crime to exist. Accordingly, it is possible that neither position will be fully supported or negated; rather, investigation of the age structure-crime pattern is more likely to determine that one, if not both, of the variant/invariant constructs is plausible.

This will be explained in greater detail as this thesis progresses, specifically when the conceptual and analytical frameworks are developed in Chapters 3 and 6 (following, respectively, discussions of the Easterlin hypothesis and how data availability shapes the proposed course of analysis). However, this thesis can address the nature of the age-crime pattern in two ways. The first of these relates to the potential for

demographic phenomena to impress upon age-crime trends which, although not explicitly discussed in the age-crime literature raised here, is implied. Greenberg (1983, 1985) refers to cohort effects as a potential source of variation in the age-crime pattern. Thus, it would seem plausible that the impact of cohort density on age-specific apprehension rates (which will be discussed in greater detail in relation to the Easterlin hypothesis in Chapter 3) could be regarded as a potential source of variance for the age-crime pattern. Indeed, O'Brien and Stockard (2009) determined that the association between cohort replacement and the age-crime curve for homicide indicated that the age-crime pattern is not 'rigidly invariant'; Sampson and Laub (1993; also Laub and Sampson 2003) similarly show that job stability (which is associated with cohort density, as will be seen in Chapter 3) is a source of variance for age-crime trends.

The second means of addressing the variance/invariance debate is more general. It relates to whether differences in the impact of structural ageing are indicated in this thesis's analysis of the age structure-crime pattern. A variant association between age and crime would be indicated by any of the following:

1. Age-crime trends change over time. This type of change would suggest that such trends are influenced by factors such as demographic change (i.e. structural ageing), social and/or life events (such as relative disadvantage (unemployment, for example)), and/or historical processes (such as changes in the surveillance methods of the criminal justice system, or the willingness of victims to report crime).
2. The impact of structural ageing differs by offence. Such variation would be indicative of some offences having an older age distribution of offenders than others, which may be related to differences in the peak age of offending and/or the process of desistance (the 'ageing out of crime') across offence types.
3. The impact of structural ageing differs by gender. For example, males may be more likely to deviate from the age-crime pattern than females for a particular offence. Such a finding may be indicative of differences in the impact of either demographic change, social and/or life events, and/or historical

processes on male and female apprehension trends, and/or differences in the age distribution of offenders for the sexes.

On the other hand, if there are only minor, or no, differences in age-crime trends over time, or the impact of structural ageing by offence and gender (suggesting, for example, that the impact of demographic, social and/or life events, and/or criminal justice factors does not change over time, and/or the age distribution of offenders is relatively homogenous by offence and gender), then the association between age and crime could be regarded as being relatively homogenous.

The following chapter focuses on the age structure-crime pattern, outlining the expectations regarding the impact of cohort density and age composition for the Australian population in light of the Easterlin hypothesis. This includes discussion of how the nature and strength of the age-crime pattern may shape the association between structural ageing and crime.

Chapter Three – The Easterlin Hypothesis

This chapter focuses on Easterlin's (1987a) arguments concerning the association between birth cohort size and relative income, and their relevance for investigation of the age structure-crime pattern. Easterlin's theory is considered in three stages: an overview of the argument, an exploration of the relative income hypothesis, and how this in turn may impact on crime trends. The arguments are consequently used to describe two specific expressions of the age structure-crime pattern – one concerning birth cohort size, and one concerning age composition effects – and how they may be applied specifically to the Australian situation. These expressions are subsequently considered within the limitations of the Easterlin hypothesis and the broader criminological literature (the nature of the age-crime pattern, measurement issues, and the unemployment-crime pattern).

3.1 Easterlin's Birth and Fortune

3.1.1 Overview of the Theory

The core argument of the Easterlin hypothesis is that the 'comparative size of one's generation' – the size of the birth cohort the individual is born into – plays a significant role in shaping the life chances of the individual (1987a: 3). Though birth cohort size is not the sole determinant of life chances, 'It [was then] becoming clear that in the post-World War II [American] economy the success of a generation's members may be crucially affected by how numerous they are' (1987a: 3).

Where a birth cohort is large, and assuming that mortality and migration rates are reasonably constant across such cohorts, the 'fortunes' or life chances of its members will be less promising than those encountered by the members of smaller birth

cohorts.¹ Thus, according to Easterlin, the ‘fortunes’ of a baby boom generation (such as that born in America during the 1950s) could be expected to be less promising than those of a smaller ‘baby bust’ generation (such as that born in America during the 1930s). Specifically, Easterlin anticipated that the members of a baby boom cohort would face an increased risk of financial insecurity. With regard to employment opportunities, for example, when the small 1930s cohort was first entering the American workforce between 1953 and 1963 it increased by around 880,000 persons annually (Easterlin 1987a: 17). In contrast, when the subsequent baby boom cohort was entering the workforce between 1964 and 1974, the annual increase in the American workforce almost doubled to 1,740,000 persons. Similarly, the median relative income for this large baby boom cohort when it was young was lower than that experienced by its smaller predecessors when of the same age.

Easterlin held that conditions such as these would lead the larger birth cohort to delay partnering and starting a family, and to experience heightened levels of strain (materialising as an increase in divorce rates) and psychological stress (producing social disorganisation). One of the areas of social disorganisation that Easterlin argued was particularly relevant in terms of birth cohort size is crime, and this will be explored following a closer examination of Easterlin’s relative income hypothesis.

3.1.2 The Relative Income Hypothesis

Cohort-specific life chances are dependent on two primary features – absolute cohort size and relative cohort size. Absolute cohort size refers to the crude number of persons belonging to a particular birth cohort. Relative cohort size refers to the size of a birth cohort in comparison with the size of the other birth cohorts progressing through their respective lifespans at the same time. These two features result in specific cohort effects. Absolute cohort size results in intra-cohort ‘density’ effects, or competition within the cohort itself for access to employment, education, and so on. Relative cohort size results in inter-cohort effects or competition across the various cohorts.

¹ I acknowledge that migration rates in Australia have not been reasonably constant as Easterlin indicates. Rather, rates fluctuate by year. This issue is not discussed further here, however, because apprehension data are unavailable by country of birth. This observation applies throughout the thesis.

An important aspect of Easterlin's arguments concerning cohort-specific life chances is the relative income hypothesis, which can be understood to unfold as follows:

1. A birth cohort develops its material aspirations in its formative years;
2. The birth cohort subsequently enters the labour market;
3. Should the birth cohort experience a tight labour market, including high unemployment levels and low wages, it strategises to maximise its earning potential and, hence, achieve its material aspirations. This may involve delaying marriage (or partnering) and having children (or at least having smaller families than previously aspired to). Incidentally, the requirement to 'strategise' increases the risk of the birth cohort experiencing stress and/or strain and associated heightened social disorganisation (crime for example), which will be returned to in section 3.1.3.

A key feature of the relative income hypothesis, which reflects how both absolute and relative cohort size influence cohort-specific life chances, is the interconnection between the '*number of births and number reaching working age*' (Easterlin 1987a: 16; also Easterlin 1987b). On the one hand, absolute cohort size determines the number of persons present at the onset of working age – the larger the birth cohort, the greater the number of persons aiming to enter the workforce at the same time. On the other hand, relative cohort size determines the ratio of younger to older workers in the employment sector. Easterlin (1987a: 17) expresses this latter situation as the 'shortage and surplus of younger men [sic] compared with older', or the proportion of positions available for younger and older persons.

Consequently, absolute and relative numbers have an effect on the employment opportunities and earning potential of each birth cohort due to changes in the supply of workers and the demand for them (Easterlin 1987a: 21; also Easterlin 1987b). Theoretically, individuals born into larger birth cohorts struggle to secure employment due to high levels of both intra- and inter-cohort competition for positions available. In contrast, those born into smaller birth cohorts will be in greater demand by employers as there are fewer persons (low supply levels) available to fill openings (meet demand). Hence, birth cohort size determines

economic wellbeing due to the role it plays in the success (or otherwise) of birth cohort members being able to secure employment, earn a good wage, and gain promotions. Theoretically, young persons from small birth cohorts will receive higher relative wages than will those from large birth cohorts, due to both the decreased absolute size of the birth cohort (decreased internal competition, an intra-cohort effect) and the relative size of their birth cohort to that of older employees (decreased cross-cohort competition, an inter-cohort effect).

Easterlin argues that the effect of birth cohort size and relative income persists across the life course, influencing how the cohort strategises to meet its material aspirations and, incidentally, experiences strain and social disorganisation. Members of small birth cohorts will have more options available to them than those of large birth cohorts. As large birth cohorts are more likely to experience higher levels of unemployment, poorer salaries and less opportunity for promotion, they are more likely to adopt a family formation strategy involving a delay in marriage and starting a family, than are small birth cohorts. For those who do not delay marriage and children, there is likely to be increased strain on individuals as they aim to fulfil partner and parental obligations and meet financial expectations. Such lifestyle-related issues are more likely to produce mental stress and social disorganisation for large birth cohorts than for small birth cohorts, which are less likely to face decision-making and strain of this nature.

A limitation of these arguments, however, is that definitions of baby boom birth cohorts relate to different periods of time (both the number of years, and by country/region). This point will be explored further in section 3.3.1, but here it can be noted that these differences require the data to be annualised, so that the birth cohorts can be appropriately compared.

3.1.3 The Circumstance of Crime

Leading on from the relative income hypothesis, Easterlin proposes that cohort-specific crime rates can be expected to be associated with the mental stress and social disorganisation levels of that birth cohort: 'If feelings of resentment and bitterness occur more often, antisocial behavior, such as crime, is likely to be more common'

(1987a: 101). Therefore, offence (or apprehension) rates are likely to be higher for large birth cohorts than for small birth cohorts. The increase in offence rates for the 15-29 year age group in the United States between the late 1950s and late 1960s (as demonstrated by Wellford (1973) with regard to violent crime), Easterlin believes, is indicative of large birth cohort size (and its associated experiences) causing age-specific offence rates to rise (which he illustrates with homicide victimisation rates). This cohort-specific proposition appears plausible on the basis that the age-crime pattern (discussed in the previous chapters) indicates that the most crime-prone ages are 15-24 years, and further by Easterlin's belief that the pressures (or benefits) of cohort membership are experienced more intensely during early adulthood. Nonetheless, Easterlin (1987a: 101) concedes that criminal activity will be restricted to a very small percentage of the affected birth cohort, while crime should be regarded as 'symptomatic of strains that are more widespread'.

Easterlin also believes that such variations in offence trends over time are often mistakenly attributed as being symptomatic of age composition effects. As suggested in Chapter 1, demographic change can also be anticipated to shape the population's total offence rate (as opposed to the cohort-specific, or age-specific, variations discussed so far) (1987a: 110). All age groups in any given population contribute to the total offence rate of the relative population. However, as the age-crime pattern (discussed in Chapters 1 and 2) informs us that crime is disproportionately committed by young persons (of approximate age 15-24 years), and offence levels decline over the life course, younger persons make a greater contribution to total offence rates than older persons. Therefore, any change in young person's share of the population age structure will have a direct impact on the contribution that this group makes to the population's total offence rates. If this group's share increases, the total offence rate can be expected to increase concomitantly; if its share declines, then total offence rates should decline.

This particular proposition therefore assumes that there is no actual change in the propensity to be involved in criminal activity. Age-specific offence rates are constant, with no change in the frequency or pattern of offending for any age group; structural, institutional or control factors (and the like) are inconsequential. Rather,

all observed change in offence trends is driven purely from demographic change (compositional effects). The potential limitations of the theory in this regard will be discussed in greater detail in section 3.3.2.

3.2 Application of the Easterlin Hypothesis for the Investigation of the Age-Structure Crime Pattern

In sum, Easterlin's (1987a) relative income hypothesis suggests that age-related demographic trends (changes in the general population) could be anticipated to influence offence trends in two ways. First, age-specific offence rates could be expected to rise and fall as birth cohorts of various size pass into and out of the crime-prone ages. For example, the more limited life chances of large birth cohorts may cause their cohort-specific offence rates to be higher than those of small birth cohorts. Second, transformations in the population age structure (the proportion of persons at different ages) could be expected to influence the population's total offence rates.

To demonstrate, the same passage from Easterlin (1987a: 104) can be annotated (in italics) to reflect these two specific propositions. First, with regard to the impact of cohort density:

From World War II through the mid 1950s, when the relative number of young adults was declining, the suicide rate [*for 15-24 year olds*] was virtually constant. Thereafter, as the relative number of young adults rose, the suicide rate [*for that age group*] increased until by the late 1970s, it was about three times that of the fifties.

Second, to reflect the impact of population age composition:

From World War II through the mid 1950s, when the relative number of young adults was declining, the [*total*] suicide rate was virtually constant. Thereafter, as the relative number of young adults rose, the [*total*] suicide rate increased until by the late 1970s, it was about three times that of the fifties.

On this basis, two specific expressions of the age structure-crime pattern can be formulated (from the Easterlin hypothesis):

1. When a birth cohort is large, *internal cohort density* is high and the members of the birth cohort will experience internal competition and stresses. This will cause the birth cohort's own (age-specific) offence rate to rise. By contrast, a small birth cohort will have a relatively low offence rate, as it should not encounter as much internal competition and stresses due to the low internal cohort density that is characteristic of small birth cohorts. This classic expression of the Easterlin hypothesis can be referred to as an intra-cohort effect, or the cohort density expression.
2. When a birth cohort is large, its *share of the population is high* relative to other cohorts, and both its own offence rate *and* its size will have a large impact on the total offence rate. That is, there is a multiplier effect between the age-specific offence rate and birth cohort size. When the large birth cohort is at the young, crime-prone ages, the total offence rate can be expected to be high. Conversely, when the large birth cohort has 'aged out' of the peak period of offending, the total offence rate will be lower. This atypical expression of the Easterlin hypothesis can be referred to as the age composition expression.

In light of recent changes in the age structure of the Australian population (discussed in Chapter 1), the two expressions of the age structure-crime pattern that emerge from the Easterlin hypothesis can be rephrased for this investigation as follows:

1. When annualised, the largest birth cohort in Australian history is the baby bust cohort born 1968-74; the single largest cohort is that born 1971. It is the offence trends of this particular birth cohort that are subsequently anticipated to deviate from the classic age-crime pattern. This would be evident if their offending trajectories either increased with age, or the onset of decline is not as rapid as the age-crime pattern would otherwise suggest.

2. The progression of this large birth cohort through the life course, paired with the smaller size of its successive birth cohorts, has caused the Australian population age structure to shift from 'young' to 'old' (ageing structurally). Young age groups in the Australian population are experiencing a reduction in their share of the population, while at the same time, older age groups are increasing their share. Consequently, total offence rates in Australia will be reduced by age composition effects.

3.3 Limitations of the Hypothesis, and Implications for the Analyses

3.3.1 Demographic Factors

There are some limitations to the Easterlin hypothesis (1987a) that need to be considered. For example, a central assumption is that small cohorts invariably follow large cohorts and vice versa; it is implied that the successor to the American baby boom cohort born during the 1950s will be a (smaller) baby bust cohort because fertility rates fell post-1950s. Easterlin makes this assumption because he does not account for the increasing number of women who would have been reaching reproductive age at the time that this potential baby bust cohort was being born. This is indicative of his conflation of the birth rate/cohort size issue.² Birth cohort size in the United States did peak around 1961 (United States Census Bureau 2004). Conversely, in Australia, despite the actual number of births per woman declining following the baby boom, the fact that there were more women giving birth resulted in this baby bust cohort being larger than the baby boom cohort. On this basis, it is not always a baby boom cohort that could be anticipated to experience the most pronounced hardship as Easterlin proposed; in the case of Australia, it is the later baby bust cohort that could be expected to experience the most hardship (as indicated by the rephrased expressions specific to this thesis).

² This may explain why the relative income of young persons has continued to decline as the baby boom cohort aged and the baby bust cohort entered the workplace (Pampel and Peters 1995: 174-75, who do not address Easterlin's (1987a) conflation of birth rates and cohort size, and so use their findings to dispute Easterlin's (1987a) theories).

This conclusion is augmented by Mackay's (1997) differentiation between these two birth cohorts. Both faced promising futures at birth, but encountered divergent life experiences during adulthood. The baby boom cohort (labelled by Mackay as the 'Stress Generation') encountered excellent employment rates, wages, working conditions and consumer choices, despite an unclear future. The adult experiences of the baby bust cohort (labelled the 'Options Generation') were the near opposite. Society was 'in the process of reinventing itself' (Mackay 1997: 7), and the vast economic restructuring occurring at the same time as the baby bust cohort was seeking entry to the workforce saw it encounter high unemployment rates (and prolonged periods of unemployment), unstable employment with waning work conditions, and lesser wages. It is this birth cohort that consequently delayed marriage and partnering, delaying and reducing its fertility levels, reflecting the family formation strategy that Easterlin predicted a large baby boom cohort would adopt.

Indeed, Jackson and Felmingham (2004) demonstrate that relative income in Australia has been much worse for the baby bust cohort than the baby boom cohort (the former being the larger cohort based on annualised numbers). The positive contribution of structural ageing to change in median aggregate incomes in Australia between 1976 and 2001 was highest around the time that the baby boom cohort would have been in its highest earning income age group of 35-44 years (3.2 per cent in 1996, and 2.5 per cent in 2001) (Jackson and Felmingham 2004). That is, in 2001, the change in age composition of the Australian population over its 1976 level contributed \$8.4 billion to aggregate median income. In contrast, as the baby boom cohort moves through and out of the high earning 35-44 year age group, and eventually into retirement, median aggregate income is projected to decline (based on anticipated change in population age structure). In particular, the negative contribution of structural ageing is anticipated to accelerate from 2011, coinciding with the oldest of the baby boomers reaching age 65 years. By 2051, change in structural ageing is expected to reduce median aggregate income by 8.6 per cent.

On the other hand, Easterlin later discussed 'leading' and 'lagging' edge birth cohorts, indicating that the younger lagging edge cohort may have the more profound

experience of his theory (see Macunovich 1997: 123). This situation is expressed succinctly by Macunovich (2002: 67):

Cohorts born on the leading edge ... tend to have higher earnings overall than those born either at the peak or the trailing edge ... [and so] the effects of smaller relative cohort size might be compounded by a “bottleneck effect” on the lagging edge: the peak cohorts glutted the market and caused relatively long-term unemployment, job mismatches, and promotion bottlenecks, outweighing the benefits of smaller relative cohort size for subsequent smaller birth cohorts.

For Australia, therefore, we may expect that the members born on the lagging edge (say between 1972 and 1974), despite being the smaller, may have experienced greater hardship than those born on the larger leading edge (say between 1968 and 1971).

A misconception with regard to the largest birth cohort has occurred in the Australian context, as explained in Chapter 1. Despite birth cohort size peaking in Australia in 1971, representing the timing of the baby bust cohort born 1968-74, the baby boom cohort born 1946-65 is often regarded as the larger birth cohort as it arose from a higher total fertility rate. The baby boom cohort *is* larger when you count the whole 19 years that the cohort covered in Australia; the Australian baby bust covered only six years. However, annualising the number of people born into these two ‘generations’ indicates that there was an average of 255,000 births per year during the baby bust compared to 220,000 annual average births during the baby boom. Thus, the younger baby bust cohort is actually the larger of the two. It also demonstrates that 19 years is an overly long period for analysis, or a ‘blunt’ analytical tool (hence Easterlin eventually dividing the baby boom into ‘leading’ and ‘lagging’ edge cohorts to show how the latter encountered harsher conditions than the former).

The benefit of annualising cohort data is further supported by the fact that the baby boom cohort differed by peak fertility and length of the boom across Western countries (and also in comparison to Western and Eastern European countries and

Japan) (Teitelbaum and Winter 1985: 68-75). The United States' baby boom, for example, did not last quite as long as the Australian baby boom; there is also a ten year difference between the timing of peak cohort size in the two countries (1961 and 1971 respectively) (Jackson 2001; United States Census Bureau 2004). Thus, each official bureau of statistics uses different boundaries to define its baby boom.

Leading from these arguments, Easterlin's (1987a) anticipation of a birth cohort-crime relationship has been rephrased in the previous section to identify the Australian baby bust cohort born 1968-74 as the birth cohort for which offence levels are most likely to indicate a departure from the age-crime pattern. Furthermore, it may be that the lagging edge of this cohort (born 1972-74) will be influenced by cohort density effects at a higher level than its leading edge (born 1968-71). Also, to deal with the differences between birth cohorts (outlined previously), this thesis will use annualised data for numbers at various ages.

A further issue with considerable methodological implications – which will be discussed further in Chapters 4 and 6 – that Easterlin did not address is that demographic change does not unfold homogenously within national populations (Jackson 2004: 4-5). With regard to the Australian population, for example, in 1994 12.9 per cent of the national population was aged 65-plus years. It is anticipated that by 2050, this age group will have increased its share to almost 27 per cent. However, this is not an accurate reflection of structural ageing across Australia's eight states and territories. The Northern Territory (and to a lesser degree the Australian Capital Territory) is much younger than the national population, and not yet 'officially' old, as indicated by 10-12 per cent being aged 65-plus years. In 2004, only 4.2 per cent of the Northern Territory population was aged 65-plus years, and it is not projected to increase to 12 per cent until around 2050. On the other hand, the populations of South Australia and Tasmania are somewhat older than the national population; 15.1 per cent of the former, and 14.5 per cent of the latter, was aged 65-plus years in 2004, and these proportions are expected to increase to 31.0 and 22.6 per cent respectively by 2050. The remaining regions are more representative of the situation for the national population. These structural variations may consequently cause the levels of support for the age structure-crime pattern to vary across regional

populations, and hence necessitates analysis of the age structure-crime pattern at the state/territory level rather than the national level.

3.3.2 Criminological Factors

Easterlin's theories regarding the association between structural change and crime also need to be located within the broader criminological literature. This includes the nature of the age-crime pattern *per se* that leads to the age structure-crime pattern; measurement issues, such as the dark figure of crime; and other causes of crime, such as unemployment. It is these issues that are the focus of discussion here.

Arguments concerning the potentially variant nature of the age-crime pattern in Chapter 2 reflect the classic expression of the Easterlin hypothesis. Specifically, Greenberg (1983, 1985; also Farrington 1986) argues that period and/or cohort effects may cause departures from the age-crime pattern. Merging these perspectives from the classic age-crime pattern with those of the cohort density expression of the age structure-crime pattern, the age-period-cohort nexus can thus be expressed for the circumstance of crime as:

$$\text{Cohort size} + \begin{array}{l} \xrightarrow{\text{Period}} \text{Encountering a poor labour} \\ \xrightarrow{\text{Age}} \text{Offences levels peak between} \end{array} \begin{array}{l} \text{market when first seeking entry} \\ \text{age 15-24 years} \end{array} = \text{Cohort Effect} \quad (\text{offence trends that depart from the age-crime pattern})$$

A cohort effect is therefore the outcome of the convergence of size with age and period effects, which in the instance of crime may cause a large birth cohort to offend at a level that the age-crime pattern would regard as 'above average' (i.e. persisting rather than desisting from crime) due to stresses arising from 'strategising' to meet material aspirations.

On the other hand, Hirschi and Gottfredson's (1983) argument would suggest that there is no age-period-cohort nexus in the criminal context; the robust and invariant nature of the association between age and crime would not permit such a model to occur. At best, any departures from the age-crime pattern that could be attributed to a

specific cohort should only be regarded as an extreme occurrence and not an example of variation in the age-crime pattern.

Indeed, discussion of the nature of the age-crime pattern in Chapter 2 demonstrated, by way of studies by Tittle and Grasmick (1998), Britt (1992), Sampson and Laub's contributions, and O'Brien and Stockard's (2009) study, that any evidence for the cohort density expression of the age structure-crime pattern is open to interpretation with regards to evidence for the nature of the age-crime pattern. O'Brien and Stockard (2009), for example, concluded that cohort replacement had a significant impact on homicide rates in the United States over the period of the analysis (supporting Greenberg's variance thesis), but because age-crime curves were generally stable once its impact had been controlled for, the age-crime pattern was predominantly invariant (supporting Hirschi and Gottfredson's invariance thesis). It is possible therefore that any evidence for the cohort density expression in Australia may illustrate that the age-crime pattern is both variant and invariant.

Likewise, any lack of evidence for the age composition argument (that is, that structural ageing has not facilitated a reduction in total Australian offence rates) may also be a reflection of the strength of the age-crime pattern, rather than a limitation in the Easterlin hypothesis. That is, young persons' offence levels relative to those of older persons may be so skewed that age composition effects do not significantly alter the level of contribution that each age group makes to total offence rates, and thus their influence is outweighed by the strength of the age-crime pattern.

Discussion of the nature of the age-crime pattern in Chapters 1 and 2 also raised the possibility of some differences with regard to offence-specific peak ages, age distributions, causes, and/or onset of desistance from offending, and also by gender and region. It should not be assumed, therefore, that the interaction between structural ageing and crime would be homogenous. The effect of change in age composition, for example, may be greatest for the offence(s) with a particularly young age distribution of offenders (i.e. offences against property), while the effect of cohort density may be greater for the offences which are more closely associated with the arguments emerging from Easterlin's relative income hypothesis (such as

unemployment, which will be discussed later in this chapter). The methodological implications of this possibility for the quantitative analyses are returned to in Chapters 4 and 6.

As for specific limitations in the Easterlin hypothesis as it relates to crime, it could be argued that his concept of crime is too general. Crime is a social construct, and official crime statistics are not representative of all crime in a society. At best, these statistics represent only the crimes that come to the attention of the victim and/or criminal justice system. The likelihood of this occurring is dependent on numerous factors (see Fattah 1997: 96-103; also Findlay 1999: 34; Hood and Sparks 1970; Jupp 1989). For example, social conceptions of crime change over time. In the instance of rape, for example, this will have an impact on the definition of the crime (and whether it is even an offence), the willingness of the victim to report the event, and the criminal justice system's treatment of the event (both of the victim and perpetrator, and general processing of the offence). Further, many crimes either go unnoticed (do not come to the attention of the victim, and so are not reported to police for further investigation) or the offender(s) does not come to the attention of police (who either do not record the report or are unsuccessful in locating an offender). This creates a 'dark figure' of crime: 'a disparity between crime events and what comes to the attention of the police' (Jackson 1990: 34). Therefore, 'recorded statistics represent only a portion of the true crime rate of a community' (Hagan 2005:11; see Binder and Geis 1983; Murphy 1988: 9; and Maxfield and Babbie 2005: 142-71).

Consequently, the age distribution of offenders that is depicted in official crime statistics may not be consistent with the age distribution of all offences (Marvell and Moody 1991). It is generally accepted that young persons do not simply commit more crime than older persons, but rather that the criminality of younger persons may be more detectable than the criminality of older persons (and hence contribute to the over-representation of young persons in the official statistics) (Farrington 1986: 218). Younger offenders are often inexperienced, more likely to engage in risk-taking activity, and susceptible to over-policing, all factors which may contribute to an increased likelihood of their actions being detected. Older offenders, on the other

hand, may be more experienced in committing offences and escaping arrest (Greenberg 1983) – or they engage in less obvious offences, say white collar crime as opposed to street crime – allowing their activities to remain concealed. The other side to this argument is that older persons actually have an increased risk of arrest as their activities can become known to police over the course of their criminal careers.

Following from these issues regarding official crime statistics, the findings of this thesis in relation to the two expressions of the age structure-crime pattern should therefore be considered to:

- (a) Reflect crime trends at the time of data collection only. That is, that the effect of demographic change may change over time in light of transitions in conceptions of crime, which may in fact be influenced by the movement of birth cohorts through the life course and changes in population age structure;
- (b) Reflect known crime only (as opposed to all crime), which may therefore under- or over-state the impact of structural ageing; and,
- (c) May be skewed by the fact that criminal activity initiated by younger persons is more likely to come to the attention of victims and police and, consequently, result in an apprehension (which, due to this thesis's analytical techniques' requirements for age-specific specific data, are the focus of this investigation). This may, for example, contribute to the offending trajectories of large birth cohorts being more indicative of the age-crime pattern than anticipated, or changes in older persons' contribution to total offence rates to be undetected.

One other important issue of consideration is the overlap between the life circumstances to which Easterlin refers and those that feature in the criminological literature. Braithwaite (1989), for example, identifies several 'facts' of crime that reflect the institutions and structures involved in the Easterlin hypothesis. These include the increased likelihood of individuals who are unemployed, unmarried (or unpartnered), and/or lacking strong educational achievement and attachment, to be involved in criminal activity. Certainly the majority of offenders in Australia have experienced unemployment (Archer and Gartner 1986; Grabosky 1977; Mukherjee

1981; Naffine and Gale 1989; Withers 1984). In the 30 days prior to their arrest in 2007, only 30 per cent of Australian males and 20 per cent of Australian females were in paid employment (AIC 2008). Rather, for the majority of offenders, their main income was some form of welfare or government benefit (32 and 47 per cent respectively), or funds provided by family or friends (17 and 19 per cent respectively). Similarly, in the United States, Chiricos (1987) found that 75 per cent of the 288 unemployment-crime related estimates in studies published post-1960 indicated high unemployment levels to be concomitant with high crime rates.

These so-called ‘facts’ of crime can be positioned in the broader criminological context of social integration (and disorganisation), alienation and anomie (Findlay 1999: 26-28, 32, 68, 96-101). Unemployment in particular is associated with crime, as it is closely tied with alienation (Currie 1985: 117; Watts 1996: 4). Individuals who have become distanced from the social structures and institutions of authority that Braithwaite (1989) identifies as risk factors for offending are more likely to experience a state of marginalisation and polarisation, which may consequently shape their criminal choices. Furthermore, Clinard and Abbott (1973) suggest that the association between crime and unemployment will strengthen during periods of dramatic population change. If the workforce is unable to adapt to, and facilitate, the demands of population growth or transitions in population structure, certain population groups are likely to encounter high unemployment rates.

Theoretically, the strain perspective of the unemployment-crime association, which portrays individual offending as a consequence of ‘stresses and contradictions in their lives’ (Box 1987: 36), is the most reflective of Easterlin’s proposition that members of large birth cohorts are more likely to turn to crime due to an inability to meet their aspirations and heightened stress levels.³ Specifically, anomie theory – one of the strain theories – suggests that the inability to fulfil employment-related expectations and associated material desires creates a sense of ‘thwarted ambition’

³ Box (1987: 36-52) explains many of the specific theories, which include strain (such as anomie and relative deprivation), control, labelling, routine activities, and cultural transmission. Gottfredson and Hirschi (1990:163) and Wilson and Herrnstein (1985: 213-36) also offer useful outlines of the common themes of theoretical constructs concerning the unemployment-crime pattern.

that may lead some individuals to offend. Furthermore, Agnew's (2005) general theory of crime – which identifies 'work', particularly unemployment and poor jobs, as one of five life domains directly having an impact on crime – explains that unemployment has a contemporaneous and lagged effect on offender patterns (reflecting the enduring impact of Easterlin's relative income concept).⁴ This is because of its association with low levels of constraint and high levels of motivation (see Gold 1963; Sheley 1983; and Tittle 1995).⁵

The association between unemployment and crime, however, appears to vary by offence, age, gender, and population unemployment levels. Chiricos (1987) found increasing levels of unemployment are more likely to coincide with an increase in property crime than violent crime; the number of positive relationships for burglary, larceny, motor vehicle theft, general property, and other property ranged between 79 and 89 per cent, whereas as the number for murder, robbery, rape, assault, and general violent ranged between 52 and 71 per cent. Only one offence, assault, was found to have no clear relationship with unemployment, being just as likely to indicate a positive association as a negative association. These findings suggest that if the Easterlin hypothesis is correct, the cohort density expression of the age structure-crime pattern may be most strongly supported for offences against property.

Allan and Steffensmeier (1989: 107-08) anticipate that the age-crime pattern extends to an age-unemployment-crime pattern; the young crime-prone age group also experiences high levels of unemployment and poor labour market conditions. However, age may also play a role in which type of offence unemployment will interact with, and if any interaction is likely to occur. Between 1959 and 1996, the arrest rates of 16-24 year old unemployed Americans indicated that they were more likely to be involved in offences against property (Britt 1997). By age 25-44 years, homicide and aggravated assaults were more common (which Britt attributes to

⁴ The theories informing Agnew's (2005) model include social control (Hirschi 1969; Sampson and Laub 1993), self-control (Gottfredson and Hirschi 1990), rational choice (Cornish and Clarke 1986; Piquero and Tibbetts 2002), routine activities (Felson 1998), and social learning (Akers 1998).

⁵ The contemporaneous and lagged impact of unemployment and crime is also discussed by Cantor and Land (1985), Allen and Steffensmeier (1989), and Sampson and Laub (1993).

increased motivation arising from older adult-restricted psychological pressures), while no interaction between age and rape or burglary was indicated. Similarly, Krivo and Peterson (2004) found that the violent offence trends of 20-24 year olds living in Cleveland, Ohio, during 1990 were most likely to be affected by labour market conditions (unemployment, secondary work, or low-wage work). In contrast, individuals aged over 25 years were influenced primarily by unemployment, while labour market conditions were of little importance to 15-19 year olds. It is possible therefore that any departures from the age-crime pattern with regard to the cohort density expression will occur prior to age 24 years for offences against property, but later in the life course for more serious offences.

The unemployment-crime pattern may also be more relevant to the male population, suggesting that the cohort density expression is more likely to be supported for males. Naffine and Gale (1989), for example, determined that an increase in unemployment for South Australian females between 1966 and 1986 had no impact on their involvement in break and enter offences, and little on larceny or total crime. Despite this trend being consistent with male offending patterns for larceny, their total offence rates, and to a lesser degree break and enter offence rates, are seen to be much more responsive to change in their own unemployment status.

While the association between unemployment and crime is very strong at the individual level, and strong at the cross-sectional level, it is less consistent over time (Kapuscinski, Braithwaite and Chapman 1998; see Freeman 2000 for an overview of these approaches). Chiricos (1987) argues that this inconsistency arises from fluctuations in the prevalence of unemployment in a population. For example, the empirical association between unemployment and crime in the United States was stronger post-1970 when unemployment levels increased by 143 per cent, than prior to 1970 (and incidentally, before the baby boom cohort entered the workforce) when unemployment levels declined by 48 per cent. Between these two periods, the number of positive relationships for offences against property increased from 74 to 98 per cent, and for violent offences from 55 to 85 per cent. This finding thus consolidates the potential for the cohort density expression to be more relevant for offences against property.

On the other hand, Wadsworth (2004: 4) suggests that ‘countries with higher levels of disorganization or instability, segregation, and labour force marginalization [including unemployment]’ will experience higher levels of both property and violent crime. The concepts to which Wadsworth refers reflect those that Easterlin proposes large birth cohorts to experience. Thus, any cohort effects identified in this analysis may be less offence-specific than the majority of unemployment-crime literature suggests.

As indicated, therefore, the criminological literature concerning unemployment is complementary to the Easterlin hypothesis, suggesting that large birth cohorts may be more likely to offend due to an inability to access gainful employment when seeking initial entry to the workforce, or initiate criminal behaviour during adulthood as an alternative means to legitimate income. It also suggests that there may be an enduring effect from early experiences of unemployment. No specific assumptions are made in this investigation, however, as to why unemployment may influence offence trends (for example job stability, commitment to work, change in routine activities, or social control); nor is the interaction of unemployment with other life events (such as marriage) or individual factors considered.

3.4 Summary and Conclusions

The purpose of this chapter has been to highlight the potential contribution of the Easterlin hypothesis to crime-related research: it provides *two* clear propositions regarding the age structure-crime pattern that, despite some limitations, are plausible and can be investigated empirically.

The first proposition is that age-specific offence rates (or for the purpose of this investigation, apprehension rates) can be expected to rise and fall over time due to birth cohorts of various sizes progressing through their respective life courses (the cohort density expression). Thus a large birth cohort (such as the Australian baby bust cohort born 1968-74) can be anticipated to show an increase in its age-specific offence rates. Such an increase could, in part, be attributed to the relative income

hypothesis, which sees large birth cohorts experience disadvantage such as high unemployment rates, thereby reducing their income levels, relative to small birth cohorts. Further to this, the lagging edge of a large extended cohort (i.e. one extending over several large birth cohorts) may experience greater cohort density effects than the leading edge. Easterlin's concept of relative income highlights the need to explore cohort-specific offending trajectories in light of broader life experiences. The anticipated unemployment-crime pattern makes unemployment rates encountered by birth cohorts when first seeking entry to the workforce a useful point of reference in this regard, and may be a source of variation in how the association between birth cohorts and crime unfolds.

The second proposition is that any change in the population age structure will concomitantly shape the population's total offence rates (the age composition expression). Australia's population is ageing structurally, so can be expected to experience a reduction in total offence (or apprehension) rates due to the proportion of the young crime-prone age group (who make the greatest contribution to total offence rates) declining. Population trends also indicate that the pace of structural ageing is not homogenous across Australian states and territories (a trend that Easterlin does not account for), and so the impact of this demographic trend cannot be anticipated to be homogenous across regional total offence rates.

Based on these propositions, this thesis's conceptual framework can now be developed based on the cohort density and age composition expressions of the age structure-crime pattern, and its potential association with the underlying age-crime pattern (which was discussed in Chapter 2).

The cohort density argument would be supported if:

1. The offence trends for the baby bust cohort (born in Australia between 1968 and 1974) are seen to depart from the classic age-crime pattern. That is, the cohort's offence levels do not decline consistently as the cohort ages. This may occur in one of three ways:

- (i) A significant departure from the age-crime pattern is indicated if the cohort has experienced an increase in its offence rate as it has aged;
 - (ii) A substantial departure from the age-crime pattern is indicated if the cohort has experienced a relatively stable offence rate, or minimal decline in its offence rate, as it has aged; and
 - (iii) A minor departure from the age-crime pattern is indicated if the cohort has experienced a reduction in the rate of decline in its offence rate as it has aged.
2. The offence trends of smaller birth cohorts are more reflective of the age-crime pattern. Specifically, their offence levels have declined consistently (or almost consistently) as the cohorts have aged.

The cohort density expression would be negated if the two expectations outlined above were reversed for the large and small birth cohorts; that is, if offence levels for the baby bust cohort decline as it ages, but offence levels for smaller birth cohorts increase as they age.

Further, the cohort density expression would be regarded as plausible if either:

- 1. There is a mixture of baby bust and smaller birth cohorts experiencing an increase in their offence levels with age; or
- 2. Cohort-specific offence trends suggest that a common period effect (such as a change in surveillance or levels of reporting crime) has impacted on the offence levels of all birth cohorts.

In addition, if birth cohorts are seen to have experienced departures from the age-crime pattern, this could be regarded as potential evidence for variance in the association between age and crime (as discussed in Chapter 2). Furthermore, if these departures differ by offence and gender, such findings could also be regarded as evidence of a variant age-crime pattern. In this respect, the level of impact on apprehension trends from cohort density (and hence, the classic expression of the

Easterlin hypothesis) could be expected to be stronger for some offences than others and/or for one of the sexes.

Recalling that Easterlin predicts labour market experiences to be dependent on birth cohort size, and that unemployment rates are subsequently being used in this thesis as a proxy variable for relative disadvantage in analyses of the cohort density expression, the unemployment-crime pattern may also produce inconsistent evidence for the cohort density expression. This may take the form of:

1. Offences against property being the offence types that cohort density has the greatest influence on; or
2. Male birth cohorts being more likely to show cohort effects than female birth cohorts.

On the other hand, the unemployment-crime literature also suggests that the circumstances of large birth cohorts may result in unemployment having a relatively homogenous impact on their offence trends.

The age composition expression would be supported if total (retrospective) offence levels have been reduced by the ageing population composition. That is, offence levels would have been higher than observed had the population not have aged structurally.

When shifting to a prospective analysis, the comparison is between projections (of offence numbers) based on the total crude rate extant in the baseline year and projected change in population size, and projections which have been age-weighted based on projected change in age composition and population size. Under these conditions, the age composition expression would be supported if the age-weighted projection is lower than the crude projection, meaning that structural ageing will reduce future offence levels.

Conversely, the age composition expression could be negated in one of two ways:

1. Change in age composition has had (or could be expected to have) no effect on total apprehension levels; or, more significantly,

2. Total apprehension levels have (or could be expected to) actually increase as a consequence of changing age composition. That is, offence levels would have been lower than observed had the population not have aged structurally.

As for the cohort density expression, the impact of age composition effects on apprehension trends may differ by offence and/or gender. This would similarly suggest variance in the association between age and crime. However, any difference in the impact of age composition effects by region may be more indicative of differences in the age compositions of their general populations than the actual age-crime pattern. Such factors may also result in differing levels of support for the age composition expression (and hence, the atypical expression of the Easterlin hypothesis).

Because the two expressions of the age structure-crime pattern (cohort density and age composition) examine different aspects of structural ageing, and hence impact on offence trends in different ways, two analytical techniques will be required for their investigation (each with slightly different data requirements). These issues will be discussed in Chapters 5 and 6. The following chapter, however, explores the empirical investigations of the cohort density and age composition expressions of the age structure-crime pattern.

Chapter Four – Empirical Investigations of the Age Structure-Crime Pattern

This chapter focuses on international analyses of the two expressions of the age-structure crime pattern. Recalling from the previous chapter, the cohort density expression anticipates fluctuations in age-specific offence rates as birth cohorts of various size progress through their respective life courses, with large cohorts being more likely to deviate from the age-crime pattern than small cohorts. The age composition expression refers to an anticipated dynamic between change in total offence levels and change in population age composition (in particular, the share of the young, crime-prone ages). Each expression will be examined in turn, including potential support for the Easterlin hypothesis, limitations, and methodological implications for this thesis's proposed course of analysis.

4.1 The Cohort Density Expression

This section focuses on investigations of the cohort density expression of the age structure-crime pattern. It is important to note at the outset that many of the studies that are presented as 'tests' of this expression do not fit neatly into this category. This is because many analysts confuse cohort analysis with age-group analysis. In other words, they refer to cohorts when they mean age groups. 'True' cohort analysis is longitudinal, and while it is concerned with age-specific change (or anomalies), these changes are assessed within the context of the experiences of each birth cohort as it has aged (i.e. each birth cohort is followed through its respective life course). Consequently, many of the studies included in this section – which have been categorised according to the aims specified by their authors – also confuse analyses of the cohort density expression with those of age composition effects. Similarly, many of these studies do not appear to acknowledge that cohort effects are, in effect, a combination of age and period effects; age and period effects together, along with size, give a birth cohort its 'unique' cohort effects (as shown in the age-period-cohort nexus in Chapter 3). Rather, the analytical techniques applied in these studies

consider the three effects separately, which differs slightly to how this thesis approaches cohort analysis. For these reasons, much of the existing research is not readily compatible with the conceptual and analytical frameworks of this thesis; that which is discussed here are used to highlight the need to advance the demographic foundations of analyses concerning the impact of cohort density on criminal activity.

Studies which investigate the classic expression of the Easterlin hypothesis fall (more or less) into one of two groups; those that do, and those that do not, expressly differentiate between smaller and larger birth cohorts. The first group more directly refers to the influence of smaller and larger birth cohorts moving through their respective life cycles, and how this has an impact on the number of persons of various ages in the population age structure. Three key sociological examinations are discussed in this regard: Maxim's (1985) analysis of juvenile court appearances in Ontario, Canada, plus Steffensmeier, Streifel and Harer's (1987) and Steffensmeier, Streifel and Shihadeh's (1992) investigations of adult apprehension trends in the United States. O'Brien, Stockard, and Isaacson (1999) also implicitly illustrate the influence of birth cohort size on age-specific apprehension rates. That study is not discussed in detail here as its focus differs from this thesis, in that it is concerned with family structure, and the analysis is restricted to homicide rates in the United States between 1960 and 1995.

The second group of studies, which are less relevant to this thesis – and so are not discussed in detail here – refer to cohorts when they mean age groups (and so do not clearly distinguish between smaller and larger birth cohorts). Most prominently, O'Brien (1989) operationalises various five-year age groups as a proportion of the population aged 15-64 years without referring to the year of birth of these so-called cohorts, and whether these 'cohorts' represent a small or large birth cohort. Similarly, it is difficult to trace the offending trajectory of any particular birth cohort as O'Brien does not present his findings as they relate to all of the five-year age groups and the periods he utilises. A further example of this approach is Savolainen's (2000) assessment of family structure and ethnic composition effects as they relate to American offence levels for the period 1960-1995.

Other analytical objectives include general explorations of age, period, and cohort effects (including Greenberg and Larkin 1985; Klepinger and Weis 1985; and the O'Brien and Stockard 2009 study referred to in Chapter 2), and investigations of the offence trends of a single birth cohort that do not allow for cross-cohort comparison (including Wolfgang, Figlio and Selling 1972; Andersson 1990; and D'Unger, Land and McCall 2002). Although these studies are not designed to address the classic expression of the Easterlin hypothesis, and so are also less relevant to the analytical objectives of this thesis (and, similarly, are not discussed in detail here), they do include some important findings and implications; for example, Klepinger and Weis's (1985) general conclusions regarding the impact of period and cohort effects; period effects (which most likely emerge from changes in reporting or political influence) have a short-term influence on offence trends, while cohort effects (which only emerge from dramatic changes in cohort-specific life circumstances) persist across the life course. This finding concurs with Easterlin's arguments concerning the long-term impact of relative income, as well as Greenberg's (1983, 1985) proposition that period and cohorts have a respective contemporaneous and lagged impact on offence trends.

Australian studies are notably absent from the following discussion, as their conceptualisation of a cohort is not consistent with the Easterlin hypothesis (and hence, that applied in this thesis). That is, they depart from the idea of birth cohorts. Recent studies, for example, considered mortality issues for an Australian prison cohort (Kariminia et al. 2007), and the criminal career trajectories of a Queensland offender cohort (Livingstone et al. 2008).

4.1.1 Tests of the Easterlin Hypothesis

Maxim's (1985) conventional linear model approach calculates the contribution of period effects (recalling from Chapter 3) that period effects are those historical circumstances that have imposed on all birth cohorts (albeit in different ways depending on their age at the time) and cohort effects (factors that result for particular birth cohorts, and which are associated with their relative size) to differences in the appearance levels of 7-15 year olds between 1952 and 1981. Interestingly, the analysis indicates that period effects are more likely to produce

variation in appearance levels for females than males, accounting for 50 and 41 per cent of the difference for the respective genders. However, the opposite trend emerges in relation to cohort effects; 28 per cent of the difference in male appearance levels, compared to 23 per cent for females, can be attributed to cohort effects.

More specific to the Easterlin hypothesis, Maxim (1985) draws on the influence of birth cohort size to explain shifts in juvenile justice practices (but does not explicitly refer to an increase in appearance levels for large birth cohorts). Maxim associates the arrival of each successive birth cohort at juvenile age (the appearance rates of cohorts being calculated as an average rate over six unspecified birth years) with an ongoing, concomitant increase in older juvenile (aged 12-15 years) appearance levels and decline in younger juvenile (aged 7-11 years) appearance levels. It is proposed that this change has been driven by a conscious change in juvenile justice (and concurrently policing) practices intended to counteract the increase in birth cohort size that occurred during the 1950s and early 1960s. The members of these birth cohorts would have turned 7-15 years during the mid 1960s and early 1970s – around the same time that the proportional change between younger and older juvenile appearance levels is evident. It appears, therefore, that the juvenile justice system has deliberately focused on older juveniles to adjust to an anticipated influx in work load, related to the growing numbers at the relevant ages.

On this basis, Maxim's (1985) findings appear to support Easterlin's proposition regarding the association between relative birth cohort density and crime. The relevance of his findings, however, may be limited. Specifically, Maxim's focus on juveniles, as opposed to adults, minimises the opportunity for relative income – which is central to the classic expression of the Easterlin hypothesis – to have influenced cohorts' behaviour. Because of their age, juveniles cannot be expected to have experienced many of the transitions that Easterlin refers to (i.e. yet to enter the workforce, experience higher or lower incomes), and to have had such transitions shape their life choices and behaviour (i.e. make decisions regarding marriage and fertility, turn to criminal activity).¹ On these grounds, Maxim's study can only be

¹ Farrington (1986) similarly concurs that some factors commonly associated with crime only appear at certain ages. Marriage, for example, cannot be investigated for 10 year olds.

regarded as a partial assessment and portrayal of the Easterlin hypothesis. Similarly, the reliability of Maxim's findings is limited because they are calculated from court statistics rather than recorded crime (which despite its limitations is nonetheless regarded as the more accurate depiction of crime).

Steffensmeier et al.'s (1987) study is a little more helpful for assessing the validity of the classic expression of the Easterlin hypothesis. This is due to the broader age range utilised (15-24 years), and analysis of apprehension trends (as opposed to court appearances). Like Maxim (1985), Steffensmeier et al. also utilise a conventional linear model approach to examine age, period, and cohort effects, between 1953 and 1984. These effects are considered more comprehensively, however, as they are investigated in relation to offence-specific rates. The three independent effects account for 72, 92, and 84 per cent, respectively, of the variance emerging from total apprehension rates. However, as a variable in a combined model, cohort effects appear to have a negligible impact on total apprehension rates. Thus, Steffensmeier et al. report that there is not a significant relationship between cohort effects and offence-specific rates.

Whether birth cohort size actually contributed to age-specific offence rates rising and falling over time, as Easterlin argues, is dependent on two measures of cohort parameters that Steffensmeier et al. (1987) regress on relative cohort size. These measures are the proportion of crime attributed to each age group relative to the total population, and the proportion of young persons involved in youth crime (similar to the conceptualisations applied in O'Brien's various studies). Generally, neither measure indicated significant variation across cohort-specific apprehension levels (total or offence-specific). However, two exceptions to this trend were reflected in the analysis. First, the initial cohort measure indicated that large birth cohorts experienced significantly higher age-specific rates for homicide and assault than small birth cohorts. Second, and of particular interest, is that the little change in age-specific apprehension rates revealed for large cohorts in relation to the latter cohort measure was actually one of decline (particularly for robbery and burglary). This finding is a contradiction to the Easterlin hypothesis. Further, the variation in cohort parameters across single-year cohorts (born 1938 to 1960) was insufficient to

conclude that birth cohort size triggers fluctuations in age-specific apprehension rates.

Although the latter findings appear to negate the Easterlin hypothesis in relation to the cohort density expression of the age structure-crime pattern, the hypothesis was developed in relation to prolonged periods of high or low births and not single years of outlying birth levels. This is because the members of prolonged (large) birth cohorts cannot be as readily absorbed by social structures as the individuals born in any single year of high or low births. Consequently, members of isolated single-year birth cohorts should not encounter the enduring cohort effects that Easterlin anticipates large, multiple-year birth cohort members will. Hence, Steffensmeier et al.'s (1987) operationalisation of birth cohorts as single-year entities may not be the most useful depiction of any cohort effects in force. Furthermore, like Maxim's (1985) investigation, the analysis makes no association between cohort size and relative disadvantage (either directly or indirectly), and does not consider offence trends beyond young adulthood. On this basis, Steffensmeier et al.'s study cannot be regarded as a full investigation of Easterlin's arguments regarding relative birth cohort size (although in fairness, the authors acknowledge that the age range would have been broader had the data been available).

These limitations may explain Steffensmeier et al.'s (1987) conclusion that the classic expression of the Easterlin hypothesis be tentatively regarded as unfounded. They do concede, however, that official statistics may conceal any variation in age-specific rates across birth cohorts as per Maxim's (1985) theory. Large birth cohorts, for example, may turn to deviant activity beyond the scope of the analysis – drug trafficking or vandalism perhaps – as its members perceive their dominant size to make them a target of the criminal justice system. Alternatively, differences across birth cohort members' attitudes may counteract any potential criminogenic outcomes; larger cohorts may develop a heightened attachment to work because they are aware of the challenge in obtaining same, while smaller cohorts may be more blasé because their privileged size permits positive conditions.

The authors also concede that a follow-up investigation of Easterlin's arguments regarding cohort density is warranted once the large birth cohort has passed through the young crime-prone ages, maximising opportunities for any cohort effects to materialise. This is the rationale of the Steffensmeier et al. (1992) investigation, which extends the age range to 15-49 years, and the period of analysis to 1953-89, and is more successful in finding evidence that concurs with the classic expression of the Easterlin hypothesis. A conventional linear model again indicates very low cohort effects, with the majority of variation in apprehension levels being attributed to age and period effects. However, the results of a cohort residual procedure and age-period-cohort size model indicate that the role of relative cohort size is more significant than portrayed in the previous Steffensmeier et al. (1987) study. Apprehensions for offences against property (and to a lesser degree homicide and aggravated assault) are seen to be more prevalent for large cohorts than small cohorts. Of particular interest, however, is that the impact of relative cohort size appears to be more significant for the offence trends of older persons than younger persons (particularly for homicide), although no such trend is evident for larceny-theft offences. This is clear evidence of the enduring impact of relative birth cohort size to which Easterlin refers, and to which Greenberg (1983, 1985) alludes, and demonstrates the benefit of analysing age, period, and cohort effects beyond the young, crime-prone ages.

In fact, an 'interaction effect' (Steffensmeier et al. 1992) appears to be present. At age 15-24 years, large birth cohort members are apprehended less often than small birth cohort members; this trend reverses between age 25 and 49 years. As Steffensmeier et al. do not perceive the classic expression of the Easterlin hypothesis to look beyond the effects of formative experiences on immediate trends, the authors believe that this finding continues to suggest that the hypothesis is flawed (at least as it applies to crime trends). The authors' stance in this regard may also reflect the limited consideration of relative disadvantage, which Easterlin proposed to be influential across the life course and not just immediate trends as the authors portray. Steffensmeier et al. do specify high unemployment rates as a factor underlying high offence rates amongst 18-24 year olds. However, cohort-specific experiences of unemployment rates are not considered because the authors believe that these have

generally been high for young persons since World War II, and so would not explain differences in cohort-specific offence patterns.

4.1.2 Limitations and Implications for Analysis of the Cohort Density Expression

Overall, these three studies present mixed support for Easterlin's proposition concerning the association between cohort density and crime. This may, in part, be attributed to some of the limitations of the studies. Generally, age and birth cohort ranges have been quite narrow, which limits the opportunity of adult life events (such as unemployment) to have influenced birth cohorts' criminal choices. The benefit of expanding the age range is evident when comparing the results across the two studies co-authored by Steffensmeier. The studies have also placed emphasis on quantifying the contribution of age, period, and cohort effects to differences in crime-related trends; this is not an objective of 'true' cohort analysis as the three effects are inter-dependent, and cannot be easily separated out (as suggested by the age-period-cohort nexus in Chapter 3).

Thus, while the analytical techniques used in these studies are very sophisticated, the analytical approach could be simplified to shift the focus from quantifying the level (or contribution) of age, period, and cohort effects to one of tracing cohort-specific offence trends over their respective life courses. That is, a shift away from age-group analysis to 'true' longitudinal cohort analysis. It is that (longitudinal) approach that I propose to utilise in this thesis for the investigation of the cohort density expression of the age-structure crime pattern.

Cohort analysis is discussed in Chapter 5, but in sum reorganises cross-sectional data to provide insight into longitudinal trends (an approach recommended by both Greenberg (1983, 1985) and Farrington (1986); in this case, reorganising snapshot age-specific apprehension rates over a period of time to reflect the offending trajectories of birth cohorts. I do not attempt to quantify the contribution of the three effects but, rather, to ascertain whether cohort analysis facilitates the identification of potential age effects (whether the trajectories of birth cohorts reflect the age-crime pattern), period effects (whether the trajectory of each cohort reflects a departure from the age-crime pattern at the same time), and cohort effects (whether only one or

two cohorts has an offending trajectory that reflects a departure from the age-crime pattern at some stage in their life course). That is, the technique explicitly demonstrates how the offending trajectories of each birth cohort have unfolded as each cohort has aged, allowing for an assessment of whether the offending patterns of the cohort reflect the age-crime pattern, and how its offence patterns compare to other cohorts.

The process and purpose of longitudinal cohort analysis is reflected in a sense within O'Brien et al.'s (1999: 1073) age-period-cohort model. This model allows the age-specific offence rate of each birth cohort to be followed as it ages (and hence the degree to which each birth cohort has conformed to the age-crime pattern), which when interpreted in the manner of true cohort analysis reveals numerous findings that O'Brien et al. do not discuss. Between 1965 and 1970, the age-specific homicide offence rate of each cohort increased. That is, each cohort experienced an increase in offence levels as it aged, which contradicts the age-crime pattern. As this trend is evident for all cohorts at the same time (albeit at different ages), it is unlikely that it can be attributed to characteristics such as size and associated relative disadvantage. Rather, it is most likely reflecting a common period effect such as a change in criminal justice system practices that impacted on all age groups between 1965 and 1970. Other trends emerging from O'Brien et al.'s analysis are more indicative of cohort effects. This is because they are restricted to one or two birth cohorts. The cohort born 1970-74, for example, is the only cohort that reduced its offence rate for homicide between the ages of 15-19 and 20-24 years.

The three studies discussed in detail in this section only analyse criminal data, generally attributing waves in age-specific apprehension rates to the movement of larger birth cohorts through the life course, without an attempt to explain the underlying cause of the cohort effect (i.e. the relative disadvantage it would have experienced as a result of being born when it was). Cohort analysis similarly utilises data for a single issue of analysis (apprehension trends in this instance), but due to the illustrative nature of the technique, its findings can be considered in light of a secondary data source to make a theoretical connection between the two associated

issues.² True cohort analysis will therefore assist in addressing the broader context of the classic expression of the Easterlin hypothesis. The (potentially) enduring influence of birth cohort size on offence trends can be demonstrated and assessed, and a theoretical connection (that is tentatively supported with empirical data) made between offence trends and relative disadvantage based on the proxy variable of cohort-specific unemployment rates.

The other methodological implication that the three key studies raise – which is consistent with arguments portraying the age-crime pattern as a variant dynamic, discussed in Chapter 2 – is that the analyses suggest that the impact of age, period, and cohort effects differ by gender and offence type. Maxim (1985) found cohort effects to be more influential for males, which is consistent with the proposition put forward in Chapter 3. Andersson (1990) similarly noted that the risk of recidivism within the birth cohort she examined differed by gender. The analyses also suggest that the cohort density expression of the age structure-crime pattern is not homogenous across types of offences. However, there is no consistent evidence regarding the offence(s) most commonly impacted by cohort effects. Steffensmeier et al. found levels of offences against the person increased during times of large birth cohorts (1987), but later found that cohort effects were more prevalent for offences against property (1992). Other studies of age, period, and cohort effects also reflect such inconsistency. Both O'Brien (1989) and Savolainen (2000) conclude that the classic expression of the Easterlin hypothesis is strongly supported for offences against property, but is generally negated for offences against the person and sexual offences. Klepinger and Weis (1985; also Greenberg and Larkin 1985) noted that differences in the age-crime pattern may underlie what appears to be a brief but dramatic cohort effect with regard to property crime, yet an enduring cohort effect

² This perspective reflects that of Glenn (1981: 362, who has been central to the development of cohort analysis, as will be seen in Chapter 5), who believes that “[a]ll too often, students of aging now fail to recognize that cross-sectional data properly analysed and supplemented with information from other sources, can often provide more nearly conclusive evidence about the effects of aging than can any other one kind of data”. It is also similar to approaches adopted by O'Brien et al. (1999), O'Brien and Stockard (2009), and Savolainen (2000), who demonstrate strong interactions between relative cohort size and family structure with regard to offences trends, with the latter being more influential than the former.

for violent offences. Hence, the variations that these various studies are indicating reinforce the requirement for this thesis to investigate the cohort density expression of the age structure-crime by gender and offence.

4.2 The Age Composition Expression

This section focuses on the age composition expression of the age structure-crime pattern. Age composition effects have been investigated in two general respects: total apprehension rates increase as the population age structure grows more youthful, or decline as the population ages structurally (Conklin 2003 offers a synthesis of perspectives and findings in Chapter 8).³ As is the case for the cohort density expression of the age structure-crime pattern, age composition effects have not been investigated in the Australian context. International investigations, however, fall into one of two categories as follows.

The most common approach has been to consider population age distributions and total crime rates in regression equations (see Marvell and Moody 1991 for a review of studies that use this method and include a (mostly secondary) measure of population age structure). This approach has had little success in isolating age composition effects, leading Marvell and Moody (1991) to conclude that demographic change may not be associated with trends in crime. However, the analyses that lead Marvell and Moody (1991) to this conclusion focus on change in the crime-prone age groups, while Easterlin's arguments concerning the interaction between age composition and crime informs us that it is the overall change in population age structure that could be expected to influence total apprehension rates.

It may be more useful, therefore, to conduct analyses that focus on determining what total offence levels would have been in the absence of structural change. It is this approach that the second type of analyses adopts (and which is favored in this thesis), primarily through an analytical framework that uses comparative techniques (i.e.

³ For analyses specific to homicide, see Avison and Loring (1986), Gartner (1990), Hansmann and Quigley (1982), and Krahn, Hartnagel and Gartrell (1986).

standardisation and decomposition) to determine the impact of changing age composition. It is the studies that fall into this second category, which are ‘tests’ of the atypical expression of the Easterlin hypothesis (even though many studies do not acknowledge this), that are the focus of the following discussion.

4.2.1 Retrospective Analyses

Analyses considering the circumstances of a youthful age structure coincide with periods of significant growth in young age groups attributed to the post-World War II ‘baby boom’. These include: Ferdinand’s (1970) analysis of the British population; Sagi and Wellford (1968), Chilton and Speilberger (1971), Wellford (1973) and O’Brien’s (1989) analysis of the United States’ population; and Hartnagel (1978) and Maxim and Jocklin’s (1980) analyses of the Canadian population. Mixed evidence for age composition effects interacting with offence trends are provided by these studies. Maxim and Jocklin, for example, conclude that there is no support for the age composition expression of the age structure-crime pattern; rather, apparent increases in total apprehension rates between 1957 and 1973 arose from population growth, rising levels of female criminality, and broader social change. On the other hand, Ferdinand determines that 12 per cent of the increase in all apprehensions between 1950 and 1965 is due to age composition effects, and as much as 47 per cent (for forcible rape), or as little as 5.5 per cent (for homicide), of observed growth in offence-specific apprehension levels. Similarly, Chilton and Speilberger determine that between 70 and 80 per cent of the increase in juvenile court referrals between 1958 and 1967 can be attributed to age composition effects.

The analyses that focus on age composition effects in relation to structural ageing – as is the focus of this thesis because the Australian population is ageing structurally – coincide with the movement of large birth cohorts (that are normally identified as the baby boom generation) through the life course and out of the young, crime-prone ages. Two studies in particular – both by Steffensmeier and Harer (1987 and 1991) – reflect the aims and analytical approach that this thesis adopts, and are thus the focus here. Other studies include Levitt (1999), who adopts a similar decomposition approach to isolate the level of demographic-related change from that of other sources (determining that changing age composition accounts for no more than one

per cent of change in apprehension levels per year between 1960 and 1995), and Cohen and Land (1987), who takes a regression-style approach to the issue (finding a highly significant relationship between the declining proportion of 15-24 year olds in the population age structure and change in homicide and motor vehicle theft rates). However, it is the Steffensmeier and Harer studies that Marvell and Moody (1991) conclude to have produced the only evidence that clearly supports the age composition expression of the age structure-crime pattern.

Steffensmeier and Harer (1987: 40) state that common applications of crime figures are ‘misleading because changes in crime rates are determined without adjusting for changes in the age structure of the population’, referring to the weakness of the more commonly applied regression analyses and how the two analytical approaches differ (as alluded to previously). Steffensmeier and Harer subsequently apply age-standardisation techniques, which are discussed in detail in Chapter 5, to two forms of criminal data (Uniform Crime Reports of offences coming to police attention, and the National Crime Survey of self-reported victimisation) as a means of determining the proportion of change in offence-specific criminal activity that can be attributed to the United States population having aged structurally.

The initial investigation by Steffensmeier and Harer (1987) considered the period 1980-1984. Calculations for the Uniform Crime Report (UCR) indicated that structural ageing accounted for 40 per cent of the change in total crime rates between 1980 and 1984. Therefore, while crude rates suggest that crime levels declined by 15 per cent, the removal of age composition effects indicate the ‘true’ decline in total crime rates to be a more modest nine per cent. Hence, while crime levels would have fallen regardless of demographic change, the drop would not have been as great had the population not have aged structurally. Similar findings were found for (total) offences against property – 43 per cent of observed change, or an adjusted rate of decline of nine per cent compared to the crude rate of decline of 16 per cent – yet negligible age compositional change is indicated for (total) offences against the person. The rates for specific offences against the person (being homicide, rape, and aggravated assault) were also found to be impervious to structural ageing, yet the impact of age composition effects differed across specific offences against property

(being more influential for motor vehicle theft and larceny-theft, and a little less for burglary and robbery rates). These findings are also consistent with those calculated from the National Crime Survey (NCS), except that the level of change attributed to structural ageing was indicated to be both lesser and greater than that reflected by the UCR. The most extreme difference between the two data sources related to motor vehicle theft (70 per cent of observed change for the UCR, compared to no change for the NCS). The difference across the remaining three offences ranged between eight and 20 per cent.

The subsequent study by Steffensmeier and Harer (1991) replicates the investigation for the extended period 1980-1988. The prolonged period of investigation indicates that the impact of structural ageing on levels of participation in crime may be greater than the earlier study suggests, particularly in relation to the UCR. All change in total crime, (total) offences against property, and two particular offences against property (being robbery, and larceny-theft) between 1980 and 1988 can be attributed to age composition effects. Further, the crude percentage change for each of these offences is one of decline (by -4.0, -5.7, -9.3, and -0.7 per cent respectively), but age-standardising the data indicates that these same offence levels actually increased (by 6.8, 6.2, 2.3, and 10 per cent respectively). Consistent with the earlier study, no age compositional change is evident for offences against the person (for rape, or aggravated assault). In contrast to the earlier study, however, structural ageing accounts for 11 per cent of the change in homicide rates over the extended period but none of the change in motor vehicle theft.

Many of these results are in stark contrast to those calculated from the NCS (with the exception that structural ageing did not influence the rate of motor vehicle theft (Steffensmeier and Harer 1991). This difference may be a reflection of the dark figure of crime and how this may distort any evidence of the age structure-crime pattern, as discussed in Chapter 3. Most notably, only the calculations from the NCS for the period 1980-88 indicate that structural ageing has had a significant impact on rates for offences against the person, as well as rape, and aggravated assault, at any time (by 75, 40, and 100 per cent respectively). Also, for all offences that the UCR indicated to have been completely transformed by change in age composition, the

NCS conversely indicates that age composition effects account for only 40 to 60 per cent of the change over time.

Steffensmeier and Harer (1987, 1991) conclude that structural ageing has had a significant impact on offence levels, which is consistent with the age composition expression of the age structure-crime pattern. Further, removal of age composition effects from crime rates indicates that criminal activity has in fact been relatively stable over the periods of analysis. The range of findings that emerge from the various analyses conducted by Steffensmeier and Harer, however, appear to raise several issues regarding the strength of the association between age composition effects and crime. The association appears to vary quite significantly by the period of investigation, offence, and data source. Age composition effects appear to be stronger in the follow-up study, suggesting that the influence of structural change on crime unfolds gradually. This would seem logical given the time it takes for birth cohorts of various sizes to progress through their respective life courses, and transform the population age structure in the process. Therefore, the analysis of the atypical expression of the Easterlin hypothesis in this thesis should endeavour to utilise data for as long a period as possible.⁴

The strongest evidence for age composition effects relate to offences against property. Steffensmeier and Harer (1987, 1991) attribute this finding to the combined effect of the transition of the baby boomers (and the successive baby bust cohort) through the life-cycle and the variant nature of the age-crime pattern across offence types (discussed in Chapters 2 and 3). The baby boom generation were in their late twenties and early thirties at the time of the analyses, and as offence-specific age distributions of offenders reveal the offenders of offences against the person to be older than those of offences against property, the density of the potential offender population at the time of the analysis was more reflective of the age distribution of offenders of the latter than the former. This reflects the suggestion put forward in

⁴ Marvell and Moody (1991) concur with this perspective, their research review demonstrating that few investigations for a single point in time have been successful in producing evidence of age composition effects, compared to roughly half of the time-series analyses that have produced significant support for the age composition argument.

Chapter 3 that the strongest support for the age composition expression of the age structure-crime pattern may be found for offences against property; younger people make a greater contribution to the total prevalence of offences against property than other offences, so any change in the proportion of young persons in a population can be anticipated to have the greatest impact on such offences. It also concurs with the suggestion put forward in Chapter 3 that this thesis should investigate the age structure-crime pattern by offence type, and appreciate the findings in light of both the age-crime pattern and how the age of birth cohorts of various size are shaping the population age structure over the course of the analysis.

As for data sources, neither the UCR nor NCS can be regarded as useful sources for these particular analyses – as noted by Steffensmeier and Harer (1987, 1991) – because the data are not age-specific. Neither data source relates to persons who were apprehended, so the actual age of perpetrators is unknown. Rather, the authors were required to age-adjust the data according to ‘known’ age-crime patterns. This is problematic in two respects. First, age-adjustment is based on the assumption that the age-crime pattern is an accurate reflection of all crime. Second, the absence of an age variable in the data sources presents a restriction as to the type of standardisation analysis that can be performed. Specifically, because the age of offenders is ‘estimated’ in effect, the analyses conducted by Steffensmeier and Harer are that of indirect standardisation. Essentially, indirect standardisation results in answers that reflect the ‘circular’ assumptions about crime. It is therefore regarded as inferior to direct standardisation, which could only have been performed had age-specific data been available (the two forms of standardisation will be further clarified in Chapter 5).

On this basis, the trends emerging from Steffensmeier and Harer’s (1987, 1991) analyses can only be regarded as indicative, and every effort should be made to obtain age-specific apprehension data for this thesis’ analyses. As will be discussed in Chapter 6, the only Australian age-specific data relates to apprehensions. On this basis, the findings from Steffensmeier and Harer’s (1987, 1991) analyses that most reflect the analyses in this thesis relate to those for the UCR. Therefore, the analyses for the age composition argument of the age structure-crime pattern can be

anticipated to be strongest for offences against property. The differences across the two data sources used by Steffensmeier and Harer also highlight the anticipated impact of the dark figure of crime on the analyses, and how it may distort evidence regarding the age structure-crime pattern. That is, although this thesis may show that age composition effects have the greatest impact on offences against property, in reality, their influence may be greater (or lower) by offence than the official statistics suggest.

Two factors that Steffensmeier and Harer (1987, 1991) do not address in their analyses are the possibility of age composition effects having a different impact by gender, and by region. Males and females have different offending patterns, while the pace of structural ageing has not been homogenous across Australia's states and territories (as suggested in previous chapters). Further, Hartnagel's (1978) analysis, which coincided with growth in young persons' share of the population age structure, found that much of the apparent differences in crude conviction rates across Canadian provinces were caused by gender and age composition effects. However, the standardised conviction rates were calculated from national population data, rather than regional population data, which from a demographic perspective is problematic. Nonetheless, Hartnagel's (1978) research suggests that investigation of the impact of changing age composition by gender and region in this thesis is warranted (with the criminal and population data corresponding to the same region).

4.2.2 Prospective Analyses

Just as the retrospective impact of changing age composition can be analysed, so too can it be projected, albeit dependent on the underlying assumptions regarding age-specific offence rates, and demographic dynamics (births, deaths, migration). These projections would be calculated from recent age-specific offence rates and anticipated changes in population age structure. Carrington (2001: 336), who offers one of the few systematic projective analyses, explains demographic-based crime projections as follows:

We are not attempting to predict future crime rates, a project which would require knowledge of future levels of all factors thought to affect crime, and a model of the way that they affect crime: rather, we are estimating the extent to

which future crime rates will be affected by projected demographic change alone ... the simple effect of changes in the proportions of the population in each age group. We do not attempt to incorporate possibly indirect effects on crime; for example, economic or social changes that may be precipitated by demographic change, and that may in turn cause a change in the age-standardised crime rate.

Assuming that age-specific offence rates will remain constant, that age composition (and size) are the only issues that will influence future crime levels, and that the Canadian population will age structurally as anticipated (based on medium population projections), Carrington (2001) projects that by 2041 the total crime rate will be only 81 per cent of its 1999 level: a decline from 8,570 incidents per 100,000 persons in 1999 to 6,978 per 100,000 in 2041. The majority of decline will occur between 2011 and 2026, with around 7,261 incidents at this time. These projected levels of decline are also very similar to those identified for offences against property and offences against the person (81 and 83 per cent respectively). Interestingly, Carrington (2001) does not provide separate results for males and females as initial investigations revealed that there were negligible differences between gender-specific projected changes. Thus this thesis may indicate that the previous impact of changing age composition has been more variable than that anticipated in the future. The projected declines in crime rates that Carrington does find can be attributed to the declining population share of the very high risk 15-24 year olds (from 14 to 11 per cent between 1999 and 2041), and high risk 25-39 year olds (from 24 to 18 per cent). These declines will be concurrent with an increase in population share for the low risk under 14, and over 39, year age groups (from 63 to 72 per cent).

As indicated previously, both retrospective and prospective analyses of the atypical expression of the Easterlin hypothesis have (generally) limited their focus to change in age composition *per se*. It may be fruitful, therefore, to consider some other factors, within the limitations of the analytical framework and data requirements for investigating age-related change to provide a broader perspective of change. The objectives of comparative analysis are explained in Chapter 5, but the following applications provide an introduction:

1. Age-standardisation controls for change in population age composition. Therefore, it indicates what total offence levels would have been had population age structure been constant over the period of analysis (whether structural ageing has had a positive or negative impact on criminal activity). However, controlling for age composition alone means that change in population size and apprehension rates have not been controlled for;
2. Size-standardisation controls for change in population size. Therefore, it indicates what total offence levels would have been had population size been constant over the period of analysis (whether population growth has had a positive or negative impact on criminal activity). At the same time, controlling for population size alone means that change in age composition and apprehension rates have not been controlled for;
3. Apprehension-standardisation controls for change in age-specific apprehension rates. Therefore, it indicates what total apprehension levels would have been had age-specific apprehension rates been constant over the period of analysis (whether the various causes of crime (such as unemployment) and/or criminal justice mechanisms (such as policing methods), have had a negative or positive impact on criminal activity). At the same time, controlling for apprehension rates alone means that change in age composition and population size have not been controlled for; and
4. These standardisation analyses can be refined by a process of decomposition, but only in relation to the proportion of change in offence levels that can be attributed to change in age composition and apprehension rates.

4.3 Summary and Conclusions

This chapter has discussed various sociological investigations indicating mixed support for the cohort density and age composition expressions of the age structure-crime pattern outlined in Chapter 3. The lack of cohesive support for the classic and

atypical expressions of the Easterlin hypothesis may, at least in part, be due to conceptual and methodological limitations. Thus, the international analyses raise numerous issues that this thesis will aim to address in its investigation of the age structure-crime pattern, and the subsequent assessment of support for the Easterlin hypothesis and the variant and invariant theses regarding the nature of the age-crime pattern.

In relation to the cohort density expression (which is investigated in Chapters 8, 9 and 10), I intend to shift the focus from age-group analysis and ‘quantifying’ the contribution of age, period and cohort effects to changes over time that has been adopted in previous studies, to one which follows the experiences of birth cohorts as they have aged. Thus, I conclude that analyses concerning the classic expression of the Easterlin hypothesis could be simplified (but benefited) from the application of a ‘true’ cohort analysis. This analytical technique is discussed in detail in Chapter 5, but traces the age-specific apprehension rates of each birth cohort as it ages. Such an approach will allow for the identification of any birth cohort that has digressed from the age-crime pattern (i.e. has not experienced a decline in its apprehension rates as it has aged). These findings can be subsequently related to the size of the cohort and relative disadvantage it has experienced (by way of a proxy variable of unemployment rates experienced by cohorts when first entering the workforce), the significance of the latter having received minimal recognition in the international analyses. Furthermore, to address this particular expression of the Easterlin hypothesis more fully, the period of birth should be extended beyond single year cohorts; the age range also needs to go beyond the young crime-prone ages (as demonstrated by the analyses co-authored by Steffensmeier) to assess the long-term impact of cohort density on a cohort’s apprehension trends. A more comprehensive portrayal of the association between cohort density and crime – and, concomitantly, the association between age and crime – could also be achieved by continuing to investigate the association by offence (as per the Steffensmeier analyses) and introducing gender and region variables. The degree to which these proposed directions of analysis can be addressed will be explored further in Chapter 6, which focuses on data availability.

In relation to the age composition expression (which will be investigated in Chapters 11, 12, 13 and 14), prior studies indicate that analytical techniques which statistically ‘remove’ the impact of change in age composition from crude rates are a useful means of determining whether structural ageing has had a negative impact on apprehension levels. I intend to adopt this approach in my own analyses, but also extend it in two ways. First, standardisation analyses could standardise for change in population size and apprehension rates, as well as age composition, to provide a broader picture of the factors underlying change in apprehension rates over time. Second, standardisation analyses could be refined by decomposition analysis, a technique that has not been applied extensively, but would indicate the component of change in apprehension rates accounted for by structural ageing, and that accounted for by underlying change in apprehension rates. Both of these comparative techniques (i.e. standardisation and decomposition) are discussed in Chapter 5. Steffensmeier and Harer’s analyses also indicate that a more accurate depiction of the impact of changing age composition on apprehension rates is more likely to emerge when the association is analysed over a prolonged period, and that ideally, calculations should be based on age-specific apprehension rates (which the authors were unable to utilise). In addition to these approaches, a more comprehensive image of the atypical expression of the Easterlin hypothesis – and, concomitantly, the association between age and crime – may emerge from continuing the investigation of age composition effects by offence (as per the Steffensmeier and Harer analyses), as well as extending the investigation with the inclusion of gender and region variables. The extent to which data availability will shape these proposed directions of analysis are also discussed in Chapter 6.

Addressing the issues outlined here means that this thesis’s analyses will not be directly comparable with those in the international literature. Hence, specific expectations regarding the two expressions of the age-structure pattern cannot be easily drawn from previous studies (whether cohort density and/or age composition effects could be expected to stronger for a particular offence, or for males or females, for example). Accordingly, it is inappropriate to develop the conceptual framework outlined at the end of Chapter 3 based on the analyses discussed in this chapter. This being said, the international analyses do reinforce the possibility that this thesis will

indicate differences in the impact of cohort density and/or age composition effects on apprehension trends by offence and gender, thus suggesting some variance in the underlying association between age and crime (discussed in Chapter 2).

It may be useful, therefore, to determine the state of the Australian age-crime pattern *per se* (in Chapter 7) prior to analysing the two expressions of the age structure-crime pattern. This should prove particularly useful given the lack of both age-crime and age structure-crime analyses for the country. Such an investigation could involve examining, by way of a series of distribution tables and correlation analyses (discussed in Chapter 5), whether young persons account for the majority of apprehensions, whether young persons have experienced change in both their own apprehension trends and their share of all apprehensions, and whether any such changes have occurred at the same time that the general population has been ageing structurally.

The following chapter discusses the three core analytical techniques that this thesis will use for investigating the cohort density and age composition expressions of the age structure-crime pattern and the nature of the age-crime pattern (i.e. correlation analysis, cohort analysis, and comparative techniques). Chapter 6 goes on to discuss the availability and purpose of population and crime data for these analytical techniques. While Chapter 5 further explains how the analytical techniques will be used to address this thesis's concerns, it is not until the conclusion of Chapter 6 that the central analytical framework is outlined. This is because, as indicated in this chapter, the availability of Australian data will play a central role in the extent to which the proposed course of analysis can be taken.

Chapter Five – Analytical Techniques

This chapter focuses on the analytical techniques applied in this thesis for the investigation of the age structure-crime pattern and, subsequently, the nature of the age-crime pattern. It is divided into three sections, each dedicated to the key analytical techniques of the three independent analyses outlined at the end of Chapter 4. First, correlation analysis (specifically Pearson's correlation coefficient), which brings together a three-tiered exploration of the age structure-crime pattern (apprehension, age-crime, and age structure-crime patterns). Second, cohort analysis, used to investigate the cohort density expression of the age structure-crime pattern (the impact of birth cohort size on age-specific apprehension ratios). Third, comparative analysis (i.e. standardisation and decomposition), used to investigate the age composition expression of the age structure-crime pattern (the impact of changing age composition on total apprehension rates). Each section will outline the conceptual foundation of the respective techniques, and its application in this thesis.

5.1 Correlation Analysis

Correlation analysis considers the association between two variables, X and Y (Bachman and Paternoster 2004: 445-46). The most common form of correlation analysis is the Pearson's correlation coefficient (r): the strength of the linear correlation between two continuous variables (X and Y have been measured at the interval level, for example) (Bachman and Paternoster 2004: 460-61; Fox, Levin and Shively 2002: 313, 316). The Pearson's correlation coefficient can be expressed as:

$$r = \frac{\sum (X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum (X - \bar{X})^2 \sum (Y - \bar{Y})^2}} = \frac{SP}{\sqrt{SS_X SS_Y}}$$

The Pearson's correlation coefficient (r) involves a comparative process of standardisation and distribution, determining the difference between the individual

and mean values of the X and Y variables. Summing the products of these deviations determines the strength and direction of the association between the two variables. The strength of the association is expressed on a scale of -1.0 to +1.0. (Harrison and Tamaschke 1984: 288):

$$-1 \leq r \leq 1$$

Where: $r = 1$ is a perfect positive linear association between X and Y .
 $r = -1$ is a perfect negative linear association between X and Y .
 $r = 0$ no linear association between X and Y exists.

The more the two variables vary in similar ways, the closer the r value will be to 1.0. Perfect r values are produced when the X and Y variables have values that are a perfect linear function of each other. Whether the value of r is positive or negative depends on whether both increase and decrease together (that r is positive), or whether increases in X are accompanied by decreases in Y , and vice-versa (then r is negative) (Bachman and Paternoster 2004: 448-51, 461; Hinton 1995: 254, 257-58). A positive correlation indicates that as one of the variables increases or decreases in value, so too does the other variable. That is, X and Y are related in the same way. Conversely, a negative correlation indicates that as the value of one of the variables increases, the value of the second variable declines. That is, X and Y are not related in the same way.

Fox, Levin and Shively (2002: 312-13) recommend that the strength of correlation coefficients be interpreted as follows, where equivalent positive and negative values are regarded as reflecting equally strong associations:

1.0 = perfect positive correlation
0.6 = strong positive correlation
0.3 = moderate positive correlation
0.1 = weak positive correlation
0.0 = no correlation
-0.1 = weak negative correlation
-0.3 = moderate negative correlation
-0.6 = strong negative correlation
-1.0 = perfect negative correlation

In this thesis, Pearson's correlation coefficient is applied to change in the population age structure and the relative change in the age distribution of offenders; the closer the value of r to 1.0, the stronger the association between age structure and crime. This is a somewhat different (albeit valid) application of the technique to its normal use, because correlations are calculated between vectors (columns) of numbers representing the ratio of change between apprehension and population share amongst age groups rather than, as is usual, numbers representing characteristics of units of observation such as individuals. As a result of this unusual use, the number of observations is small, which may influence the r calculated, and, accordingly, their interpretation and reliability (and, thus, the relevance of Fox et al.'s recommendations outlined above). The correlation analysis described here forms part of Chapter 7 – following distributions relating to the apprehension trends of the total population and 18-25 year olds – for the purpose of measuring the strength of the relationship between structural ageing and apprehension trends, and whether the association (if any) differs by offence category or time.

5.2 Cohort Analysis

Cohort analysis is a technique designed to examine 'the changes in patterns of behaviour or attitudes' of one or more cohorts, and especially birth cohorts (Uslaner, in Glenn 1977: 5). Developed by demographers, cohort analysis has been widely used to investigate changes across the life course. Now more broadly used in the social sciences, cohort analysis has evolved to examine any form of social, cultural or political change. Such an approach has allowed for cohort analysis to adopt a period analysis perspective, whereby 'processes of social change are related to the successive replacement of generations [or cohorts] where each generation grows older in an ever changing historical context' (Hagenaars 1990: 315). In short, cohort analysis refers to a longitudinal method for examining the cumulative experience of a cohort. In contrast to panel studies, however, these cohorts are not regarded as 'closed' (i.e. lose or gain no members, or containing the self-same members as they age). Rather, cohorts are regarded as 'open', with cohort analysis merely showing

change in the level of the issue of interest experienced by the cohort as it has aged, irrespective of which individuals were actually involved.

The foundation of cohort analysis is to draw ‘simultaneous synchronic and diachronic’ comparisons (Glenn 1977: 9-10). Three independent variables and one dependent variable are employed in cohort analysis. The independent variables are age, period, and cohort (Glenn 1977: 11, 13; Hageaars 1990: 317-20); it could also be argued, however, that cohort effects are a dependent variable because they are a combination of age and period effects (as shown in the age-period-cohort nexus in Chapter 3). The dependent variable is the issue of interest – in this thesis, criminal offences operationalised as apprehension ratios – which is examined for one or more cohorts at several points in time. To facilitate such observation, cross-sectional data by age are reassembled longitudinally in a table matrix (a ‘Lexis Diagram’), by ‘ageing’ the cohort appropriately for each observation. This involves organising data around identical intervals on three measures: the number of years making up each birth cohort, the number of years making up each age group, and the time interval between each observation of the dependent variable. For example, if a cohort is defined as having been born over a four year period, its age-specific apprehension ratios will similarly need to be considered for four year age groups and observed at four year intervals. The age-specific apprehension ratios of a cohort born between 1969 and 1972 then may be observed at age 22-25 years in 1994, 26-29 years in 1998, and 30-33 years in 2002.

The three effects associated with cohort analysis (age, period, and cohort) have already been raised in this thesis (by way of Greenberg’s variant thesis concerning the nature of the age-crime pattern in Chapter 2 for example). Most simply, age effects refer to biological, social and legal manifestations (and the like); period effects refer to historical circumstances; and cohort effects reflect (by and large) the combination of cohort size, age effects, and period effects (shown in the age-period-cohort nexus in Chapter 3).

Age effects refer to the age at which cohorts (and the individuals within them) do certain things such as enter or leave school, marry, have children, commit crime.

They may manifest as changes in the dependent variable (apprehension ratios, for example) as the cohort ages. This is a useful means of examining whether a cohort has experienced a decline in its apprehension ratios as it has aged (as the 'traditional' relationship between age and crime would suggest). In comparing cohort-specific observations of the dependent variable over time (or as the cohort ages), any variation in the dependent variable can be tentatively labeled as an age effect. However, the meaning of age in cohort analysis can take on numerous forms. Such interpretations of age may include the duration of time between birth of cohort members and the point in time at which they are observed, or more advanced interpretations such as sociological perspectives of age (including age-dependent social roles, status and participation) (Hagenaars 1990: 317).

Period effects refer to changes in the dependent variable that can be attributed to an influence(s) occurring at a specific point in time, either at the time of observation or at some point lying between two observations. For example, if all cohorts experience an increase in their apprehension ratio between the same points in time (say between 1998 and 2002), this may be reflecting a trend arising from the criminal justice system (a change in policing practices or reporting levels perhaps).

Cohort effects refer to changes in the dependent variable that can be attributed to the combination of age and period effects, that is, cohort-specific influences. These effects may relate to influences that cohort members were exposed to over their lives as a direct result of being born when they were. For example, the classic expression of the Easterlin hypothesis (1987a) suggests that the relative size of the cohort may impact on its life chances, such as employment and housing. If only one or two cohorts in the analysis are seen to experience an unexpected rise or fall in the dependent variable over time (for example, if only one birth cohort experiences an increase in its apprehension ratio as it has aged), then this can be tentatively regarded as a cohort effect.

It is important to acknowledge that cohort analysis cannot be regarded as a definitive analytical approach. Although each of these three effects (age, period, and cohort) is more strongly associated with one particular independent variable, they are not

restricted to the influence of any single independent variable (Glenn 1977: 13-17). Rather, underlying each comparison of observations is always the confounding relationship between two of the three independent variables (which are likely to have multiple definitions and/or functions in themselves, as alluded to by the age-period-cohort studies in Chapter 4). This interception of effects was referred to with regard to period effects underlying potential cohort effects. Hagenaaars (1990: 327) refers to this confounding of age, cohort and period effects as a perfect linear relationship, a relationship emerging in numerous forms in both quantitative and qualitative research. Similarly, Glenn (1977: 13) explains the relationship as:

Age [being] a perfect function of cohort membership and period of time, cohort membership [being] a perfect function of age and period, and period [being] a perfect function of age and cohort membership.

Methodologically, therefore, cohort analysis creates an ‘identification problem’ (Hagenaaars 1990: 327).¹ On this basis, ‘a strictly statistical solution to the age-cohort-period problem is not possible ... [whereby cohort analysis] shows effects but gives no evidence on the influences which produce those effects’ (Glenn 1977: 14-15), the number of these potential influences in relation to crime being, according to Gottfredson and Hirschi (1990: 226), ‘unlimited’. Both Glenn (1977:19) and Hagenaaars (1990: 358) concede that it is essential that the findings from cohort analysis be informed by associated theory and evidence, and complemented by further analysis (such as cross-sectional or standardisation analysis) to develop a more comprehensive portrait of the effects of ageing. To this end, this thesis draws upon the variance/invariance debate concerning the relationship between age and crime, the classic expression of the Easterlin hypothesis, and unemployment rates experienced by birth cohorts when they would first have been seeking entry to the workforce to. In addition, investigation of the age structure-crime pattern is furthered by comparative analyses (discussed in the next section) to examine the impact of age composition effects.

¹ For further discussion of the ‘identification problem’, see Fienberg and Mason (1985), Heckman and Robb (1985), Jagodzinski (1984), Palmore (1978), Pullum (1977, 1980), and Rodgers (1982).

The analyses discussed in Chapter 4 indicated that ‘true’ cohort analysis has not been widely applied to examine the association between cohort density and crime. Similarly, the term ‘cohort’ has been incorrectly used in many criminological studies, which results in misleading answers (i.e. what has often been analysed is age groups rather than longitudinal birth cohorts). Furthermore, criminology has more generally applied cohort analysis to consider cohorts beyond those referring to birth, namely groups that have shared a similar experience within the criminal justice system such as persons institutionalised at a common facility, receiving a similar sentence either at or for the same period, or who have been exposed to an experimental stimulus (Maxfield and Babbie 2005: 194). Alternatively, the same individuals have been examined over time (as in panel studies). Examples of studies that have taken one of these approaches were provided in Chapter 4, and it is these approaches that have been most commonly applied in the Australian context. Hence, while this thesis adopts a more conventional approach to cohort analysis *per se* (by focusing on birth cohorts), it nonetheless represents a less traditional conceptual and analytical application of cohorts in the criminological sense (by not analysing age groups or cohorts linked by a common experience within the criminal justice system).

In this thesis, cohort analysis is used to investigate the cohort density expression of the age-structure crime pattern (in Chapters 8, 9, and 10). More specifically, whether the age-specific apprehension ratios of birth cohorts reflect the age-crime pattern; whether younger (larger) cohorts experienced higher ratios than older (smaller) cohorts; whether the cohort-specific apprehension trajectories reflect a decline in ratios as the cohort has aged; and, whether any transgressions from the age-crime pattern can be linked to period and cohort effects (namely, differences in birth cohort sizes and the associated effect that this has had on relative disadvantage). The process of cohort analysis is explained further in Appendix A (section A.1).

5.3 Comparative Techniques

As expressed by Rowland (2003: 120), ‘Concepts and theories, such as the demographic transition, provide a general comparative setting for research, but

empirical comparisons are needed to substantiate conclusions and improve research'. In other words, it is essential to employ quantitative measures that will draw comparisons between populations with a view of seeking in-depth explanations of population and social change. Demographic summary measures refer to simple averages, such as the 'crude rate' or the total percentage doing X or Y. For a summary measure to be compared appropriately – and provide an explanation for the population and social change to which Rowland (2003) refers – it needs to be refined. This involves a process of controlling for differences in compositional attributes (such as population age structures) so that the populations being compared are, in the statistical context, the same. Consequently, refining a summary measure provides a possible explanation as to how compositional differences between populations, or within the same population over time, may have contributed differences in the experience of the phenomenon of interest (such as apprehension ratios).

One specific method for refining demographic summary measures is standardisation (Carmichael 1995; Rowland 2003; Jackson 2006; see Kitagawa (1955, 1964) for the earliest exponents of standardisation). The rationale of standardisation is to demonstrate the influence of compositional variance, and involves 'removing' compositional effects (such as age) that compromise the measurement of trends in the variable of interest (offence trends, for example). Such a method is useful because trends in any summary variable (like the total apprehension ratio) are compromised by at least two factors: changes in the underlying variable (such as the actual apprehension rate), and changes in the composition (or size) of the population for which the summary measure is being examined.

In sum, standardisation involves making populations 'mathematically comparable' – or the same – by applying a singular, standard set of compositional attributes (such as population age structure). This may involve controlling for differences in compositional attributes between multiple populations at the same point in time, or within a single population at multiple points in time. The attribute may relate to one of the populations being compared, or to a completely different population (although it makes more sense to use the former approach). The attribute is then held constant

over time, applying to it the observed age-specific ratios of the variable of interest across the period being examined. The summed results for each year in the analysis indicate what the total ratio or number of the variable of interest would have been *had the compositional attribute not changed over time*, with the difference between the actual and standardised level taken to indicate the extent to which changes in the compositional attribute have either reduced or increased the variable of interest. For example, the 1987 age structure could be held constant across each year between 1987 and 1997, and applied to the actual offence ratios for each year, to indicate what offence numbers would have been had the population not aged structurally.

This process can be expressed as the following equation:

$$Ms(i) = \sum c mi(c).pi(c)$$

Where: $Ms(i)$ = the actual population composition standardised to that of the standard population composition;
 c = the compositional categories for the comparative variable;
 $mi(c)$ = the specific measure for the standardised population for the compositional categories; and
 $ps(c)$ = the proportion of the standard population across the compositional categories.

This form of standardisation is *direct* standardisation. In the example of age-standardisation, this means that observed age-specific offence rates are applied to population numbers at each age. It differs from another form of standardisation, one which is often utilised in the existing studies of the association between structural ageing and crime trends: *indirect* standardisation. In the absence of known local age-specific offence rates, the known rates for elsewhere – or estimated rates calculated from known age-crime trends (as per Steffensmeier and Harer (1987 and 1991), for example) – are applied to the total offence numbers on a pro-rata basis, thereby generating an approximation of crime by age.

Decomposition analysis is a ‘variation’ of standardisation analysis (Carmichael 1995: 51). Here, the objective is to decompose the difference between two summary measures (say the difference between the 1987 and 1997 total offence ratios) into the components that are due to differences in the population composition (such as age structure), and differences in a specific measure (such as all factors that influence apprehension rates, including changes in surveillance and reporting levels), to determine the ‘real’ change in a measure over time. It does not, however, account for change in population size, because the analysis works with rates.

Retrospective Analysis: In this thesis, three applications of direct standardisation are used to investigate the prior impact of the age composition expression of the age structure-crime pattern: age, size, and apprehension (in Chapters 11 and 12). Age-standardised numbers indicate what apprehension numbers would have been over time had the population age composition (at the beginning of the period) remained constant, but actual population size and apprehension levels unfolded. Size-standardised numbers indicate what apprehension numbers would have been over time had population size (at the beginning of the period) remained constant, but actual age composition and apprehension levels unfolded. Apprehension-standardised numbers indicate what apprehension numbers would have been over time had age-specific levels (at the beginning of the period) remained constant, but actual age composition and population size unfolded. In addition, decomposition analysis refines the standardisation analyses, calculating the component of change in the crude apprehension ratio over time that changing age composition and apprehension levels account for. The processes used are explained further in Appendix A (section A.2).

Prospective Analysis: In order to ascertain the future impact of the age composition expression of the age structure-crime pattern, I also use a technique I call ‘simple decomposition’ (in Chapters 13 and 14). This two-step process holds apprehension levels constant at their 2004 level and variously applies them to changing population size (crude projection), changing age composition (resulting in an age-weighted projection which allows for both changing age composition and population size) and constant population size (resulting in a size-standardised projection where size is

held constant but age composition changes as projected). The difference between the various sets of results is then determined. The processes used are explained further in Appendix A (section A.3), but summarised, the approach is as follows:

<i>Step A</i>	
Crude projection	= effect of changing population size only
Age-weighted projection	= effect of changing size and age composition
Difference	= effect of changing age composition

<i>Step B</i>	
Age-weighted projection	= effect of changing size and age composition
Size-standardised projection	= effect of changing age composition only
Difference	= effect of changing population size

5.4 Summary and Conclusions

This chapter has outlined how the three analytical techniques that are used in this thesis to investigate the age structure-crime pattern (and the associated nature of the underlying relationship between age and crime) work, and what they achieve.

The first analytical technique, being correlation analysis, measures the direction and strength of a relationship between two variables. Such an analysis will provide a preliminary indication of whether there has been a change in age-crime trends, and whether these trends have occurred concurrently with change in the age composition of the general population, by offence and region. This analysis, which forms Chapter 7, thus provides insight into whether the age-crime pattern is variant or invariant, and as to whether cohort and/or age composition effects are likely to be identified in the ensuing analyses.

The second analytical technique, being cohort analysis, reorganises cross-sectional age-specific apprehension data to examine the longitudinal apprehension trends of birth cohorts. This technique is used to examine the cohort density expression of the

age structure-crime pattern (i.e. the classic expression of the Easterlin hypothesis) because it allows for the easy identification of birth cohorts that have experienced criminal trajectories which depart from the age-crime pattern (i.e. which cohort(s) has experienced an increase, rather than a decline, in its apprehension ratios as it has aged, and thus extended its participation in crime beyond the young crime-prone ages). These findings can, subsequently, be related to the size and relative disadvantage (in this case, unemployment rates) of cohorts to determine which findings are reflecting a cohort effect, and which are more likely to be reflecting a (common) period effect. Accordingly, cohort analyses permit for an assessment of whether birth cohorts are a potential source of variance in the association between age and crime, and whether large birth cohort size (and thus high levels of relative disadvantage) is more likely to result in such cohorts offending (or at least being apprehended) at a higher than anticipated level. Conducting such analyses by gender, offence, and state/territory would allow for a further assessment of potential variance in the age-crime pattern and impact of cohort density.

These analyses are refined in Chapter 6, once data availability has been determined, but are conducted in three stages, each using a slightly different approach. Total apprehensions are investigated in two stages (in Chapter 8). First, changes in age-specific apprehension ratios are identified over time (a cross-sectional analysis), and second, the same age-specific apprehension ratios are reorganised via the Lexis diagram to reflect the offending trajectories of birth cohorts (a longitudinal analysis). Offence-specific apprehensions are only investigated longitudinally (in Chapter 9), followed by a comparison of the sets of cohort-specific apprehension trends (in Chapter 10).

Finally, comparative techniques, which control for the impact of change in comparative measures (specifically population age composition, population size, and apprehension levels), are used to examine the age composition expression of the age structure-crime pattern (i.e. the atypical expression of the Easterlin hypothesis). Standardisation indicates what total apprehension levels would have been had there been no change in comparative measures, while decomposition indicates the contribution of changing age composition and apprehension levels to the difference

in crude apprehension ratios over time. Hence, such analyses indicate whether structural ageing has had a negative (i.e. reducing or containing) impact on total apprehension levels over time, and whether this impact (if any) has been higher or lesser than that of population growth or change in apprehension levels. Like the cohort analyses, conducting the comparative analyses by gender, offence, and state/territory would provide insight with regard to the potential variance in the association between age and crime and impact of age composition effects.

This aspect of the analysis is also refined in Chapter 6, but is conducted in two stages, again taking a slightly different approach in each. Using standardisation and decomposition analyses, the impact of past change in apprehension levels, population size, and age composition are calculated in relation to total apprehension levels (Chapter 11), and offence-specific apprehension levels (Chapter 12). The same approach is subsequently taken in calculating the impact of prospective change in comparative measures, which in this instance, are calculated from ‘simple decomposition’ analyses (Chapters 13 and 14).

Having established the appropriate analytical techniques and their application for this thesis, the following chapter discusses the complimentary data requirements, and how the availability (or otherwise) of such data shapes the central analytical framework.

Chapter Six – Data Collection

Having outlined the conceptual framework of this thesis, and the analytical techniques that will be used to address it, this chapter has two aims. First, it outlines the data requirements relative to each stage of the quantitative analyses: an overview of the state of the age-crime pattern and the relationship between age structure and crime using correlation analysis, an investigation of the cohort density expression of the age structure-crime pattern using cohort analysis, and a retrospective and prospective investigation of the age composition expression of the age structure-crime pattern using comparative techniques (i.e. standardisation and decomposition). Discussion in this regard is based on the two streams of data that each of these analyses requires, being population and apprehension data. In addition, the availability of relevant Australian data will be outlined, and this thesis's analytical framework subsequently outlined.

6.1 Data Requirements and Availability

This section focuses on the data requirements that the previous chapters have established as prerequisites for the analyses utilised in this thesis. The variables identified in Chapters 2, 3, and 4 for investigation are age, gender, state/territory, and offence type to accommodate potential variations in the age-crime and age structure-crime patterns. Also, all analyses require the population and apprehension data to be organised around identical age groupings, and for population and apprehension data to correspond to the same state/territory.

6.1.1 Population Data

The three analytical techniques (correlation analysis, cohort analysis and comparative techniques) are reliant on population data, organised by age, sex, state/territory and time, as a means of measuring the impact that structural ageing is having on apprehension trends. However, whereas correlation analysis, cohort

analysis, and decomposition can be applied only to retrospective population data, standardisation can be applied to both retrospective and prospective population data. Both of these streams of population data were available from the Australian Bureau of Statistics (ABS).

The retrospective population data used in this thesis are drawn from a time series data set sourced from *Population by Age and Sex, Australian States and Territories* (ABS 2005a). Each spreadsheet indicates the annual estimated resident population for total, male, and female populations, by state/territory, and individual ages between 0 and 100-plus years, between 1971 and 2004 (as of June 30). Intercensal population estimates are based on the previous year's estimates, adjusted for births, deaths, and net estimated interstate and overseas migration.

This organisational style makes the data ideal for the quantitative analyses for several reasons. First, the individual ages could be aggregated into age groups that reflect the age groups in the available apprehension data. This is important, as each analysis requires corresponding age groupings in the population and apprehension data, and the different sources of apprehension data generally use different age groups. Similarly, the regional population data can be readily matched with the region relative to the apprehension data.

The prospective population data used in this thesis, also accessed from a time series database, are from *Population Projections, Australia, 2002-2102* (ABS 2005b).¹ Each spreadsheet indicates the annual expected number of persons for total, male, and female populations, by state/territory, for individual ages between 0 and 85-plus years, between 2004 and 2051 (as of June 30). Numbers are calculated by the ABS via the cohort-component method, whereby the sex and individual age characteristics of the base population are adjusted on a yearly basis, and derived from sets of assumptions relating to future fertility, mortality, and overseas and internal migration. The numbers indicate future population growth and change, on the basis that the assumptions prevail across the entire projected period. The data are released

¹ More recent projections (ABS 2008b) became available after the analyses were completed.

in three series of projections, being Series A (high projection), Series B (medium projection) or Series C (low projection). Series B projections are utilised in the following analyses.²

Population data are uniformly collected, organised and adjusted to provide intercensal estimates between population censuses by the ABS, and therefore can be regarded as internally consistent. However, the ABS acknowledges that the accuracy of population estimates is reliant on the quality of source data, with one main source of potential error relating to interstate migration estimates (that are derived from Medicare change of address data). The prospective data, on the other hand, are dependent on the assumptions about future fertility, mortality and migration, and at all times reflect these assumptions. In other words, they are not concrete forecasts of future population size and structure, but rigorously calculated estimates of these.

6.1.2 Apprehension Data

As indicated, the proposed course of analysis for this thesis requires that apprehension data be organised by age and sex of the alleged offender, the offence the person of interest was charged with, state/territory, and over time (preferably 1972-present). Apprehension data is favoured over court and/or imprisonment data as it is regarded as a more reliable source of offence trends (Fattah 1997: 97). It is similarly favoured over victim data, which, despite being more representative of all crime committed, does not include an offender age variable (the age of the offender being unknown). The analytical techniques also require the data to be accessed in a format that includes all of the appropriate variables in a single output (and which could be subsequently entered, or transported, into Excel spreadsheets). Hence, cross tabula is the desired data format.

² I use the medium series (B) population projections (ABS 2005b). These assume annual net international migration of 110,000 beginning immediately, fertility falling to 1.7 births per woman by 2018, and life expectancy at birth increasing to 84.9 years for males and 88 years for females by 2051. Carrington (2001) reported findings from his prospective analysis of Canadian offence levels based on medium population projections only, initial investigations revealing that insubstantial differences in prospective offence levels were calculated from low, medium, and high population projections.

Accessing apprehension data that met these requirements proved challenging. Specifically needed was apprehension data that had been organised to indicate all of the appropriate variables in a single output, and which was also available over time. Ideally, the apprehension data would be sourced from a national collection by state/territory. This is because it would allow for direct regional comparisons by consistent organisation of age and definition of offences. As appropriate data of this form could not be accessed, the availability of apprehension data specific to Australia's states and territories was investigated. This process revealed considerable variation in the accessibility of appropriate regional data. The availability of national and regional apprehension data, and its appropriateness for this thesis, was as follows.

National: The only publicly accessible national data collection that could be located for Australian apprehensions at the time of conducting the analyses was *Source Book of Australian Criminal and Social Statistics*.³ This source contains data compiled by Mukherjee (1989, in association with the Australian Bureau of Criminology (AIC)), and includes state/territory level recorded crime data for several key offences, and various periods of time (as early as 1921 and as recent as 1987-1988, depending on state/territory).⁴ Unfortunately, an age variable is not included in the collection for one of two reasons: the failure of original collectors to record the age of the alleged offender, or inconsistent recording of age over time. On this basis, the apprehension data included in *Source Book of Australian Criminal and Social Statistics* did not meet data requirements for the various analyses utilised in this thesis.

The majority of the remaining national data collections relating to the Australian criminal justice system pertain to victims, criminal courts, and/or corrections. These collections are based in the National Centre for Crime and Justice Statistics (NCCJS,

³ Subsequent to conducting the analyses for this thesis, the ABS has released its first issue of *Recorded crime – Offenders, Selected States and Territories, 2007-08*, which relates only to 2008/09. Thus, it will be sometime before such a data collection can be utilised for the methodologies employed here.

⁴ *Source Book of Australian Criminal and Social Statistics, 1804-1988* (Mukherjee 1989) also includes data relative to lower and higher criminal courts, and correctional facilities.

which is based in the ABS).⁵ Enquiries were made as to the possibility of extracting age-specific apprehension data from the remaining collections. The NCCJS advised that the *Crime and Safety Survey, Australia* included a limited quantity of offender-orientated apprehension variables, which could be cross-tabulated to reflect the data requirements (pers. comm. 27 April 2007). Such cross-tabula would be restricted to the years 1992, 1998, 2002, and 2005, organised by age of offender, sex, state/territory, and household crimes (break-in, attempted break-in, motor vehicle theft). However, as these data were available neither annually nor at observational periods equivalent to the groupings for age (four year age groupings, at four year intervals, for example) they were incompatible with the analytical techniques. The use of the data was further restricted by broad age groupings, and very limited range of offences.

The Australasian Centre for Policing Research also advised that it had no knowledge of a national data collection for Australian offender-orientated apprehension data (pers. comm. 25 July 2005). It recommended seeking data collected through state/territory research centres, although staff were uncertain of public access to data organised in the required format. This approach to data collection was subsequently adopted, and extensive investigations revealed that appropriate data could be accessed for South Australia and Western Australia only.

South Australia: The primary body responsible for the collection and collation of offence statistics in South Australia is the Office of Crime Statistics and Research (OCSAR). Its annual publication *Crime and Justice in South Australia* (published since 1982) contains numerous tables relating to apprehensions (and also to criminal courts and corrections).⁶ The most relevant tables for this thesis relate to offences cleared by way of an apprehension, or crimes reported or becoming known to the police. These data relate to actual (alleged) offenders of criminal offences, organised by age and sex, and the offence they have been charged with.

⁵ The AIC was also responsible for the collection of national correction data prior to the ABS.

⁶ Enquiries were made with OCSAR as to the availability of data prior to 1982. OCSAR advised that it did not hold such data, nor was it aware of alternative outlets.

The OCSAR data are therefore suitable for considering the impact of population ageing on offence trends for an extended period of time, by sex, and by offence category. Their application is restricted, however, to correlation (and distribution) and comparative analyses (i.e. they are unsuitable for cohort analysis). This is because the age variable is not organised around consistent age intervals (for example, all age groups do not relate to equal four year periods), which is a requirement for cohort analysis. Age brackets are, however, consistently organised over time (the same age brackets have been used annually), making the data appropriate for comparative analysis.

Nonetheless, for viable and consistent analyses to be conducted, substantial reworking of the data is required. First, analyses utilising the OCSAR data are necessarily conducted for two separate periods (1987-1997 and 1998-2004) to account for the different counting rules applied by OCSAR over these two periods.⁷ Second, offence-specific data applied in the analyses are calculated only from offences that are common to each year of the analysis, and necessarily exclude all data relating to 'Other Offence'. Similarly, to increase the reliability of the analyses, data prior to 1987 are excluded as they are much more restricted with regard to offence type inclusions.

Further details in relation to the organisation of the OCSAR data for this thesis are included in Appendix B (section B.1).

Western Australia: Criminal justice statistics for Western Australia are collated and released primarily by the Crime Research Centre (CRC), based at the University of Western Australia. The publication deemed most appropriate for this particular investigation is *Crime and Justice Statistics for Western Australia* (released since 1991), which contains offender-orientated apprehension data (and also criminal court

⁷ Between 1987 and 1997, the counting unit used was all offences, including multiple counts for the same offence listed on the apprehension report. Between 1998 and 2004, the counting unit was all separately listed offences on the apprehension report (multiple counts for the same offence were counted as one offence as they generally relate to a single incident, whereas separate listings generally indicate separate incidents).

and corrections data). As for the OCSAR data, the CRC apprehension data are organised by the age and sex of the alleged offender, and the offence they have been charged with, and are available on an annual basis.

On this basis, the apprehension data available from the CRC are suitable for all three analytical techniques (and subsequently, all levels of the analysis). However, the data are available for a shorter period of time than the OCSAR data outlined previously. Prior retrospective analyses of age compositional change (discussed in Chapter 4) highlighted that analyses of this type should be conducted for as long a period as possible in order to maximise the opportunities for the impact of change in age composition to emerge empirically. While a retrospective analysis of age compositional change for Western Australia may not be appropriate in this regard, a prospective age composition analysis could be conducted for the state. Such an analysis would provide a useful comparison to the equivalent South Australian analysis.

Unlike the OCSAR data, however, the CRC data are ideal for cohort analysis due to the organisation of age groups around consistent intervals (four year groupings), and their availability at the corresponding time intervals (in this instance, every four years, being 1994, 1998 and 2002).⁸ As such, in addition to Western Australian offence trends being investigated in relation to general exploration of the age-crime and age structure-crime patterns, and prospective age compositional change, they will also be analysed with regard to the cohort density expression of the age structure-crime pattern.

Further details in relation to the apprehension data for Western Australia, and its organisation in relation to this thesis, are included in Appendix B (section B.2).

Apprehension data for the other states and territories of Australia are much more limited, and I detail these briefly as follows (see Appendix B, section B.3, for further details, including the national collection discussed earlier).

⁸ The 2006 data were not available at the time of conducting the analyses.

New South Wales: The Bureau of Crime Statistics and Research (BOCSAR) is the primary body for criminal data collection in New South Wales. Its major publication of apprehensions data is *Recorded Crime Statistics* (1998-present), but data are organised only by offence and locality. That is, the data are not organised by age and, whereas the population data reflects all of New South Wales, this data only relates to some areas of the state.

BOCSAR staff were, however, willing to make a spreadsheet available for persons of interest identified by New South Wales police, organised by age, gender and offence, for the period 1995-2004. This data would be unsuitable for analysis of the cohort density expression of the age structure-crime pattern because of the inconsistent groupings of the age variable. Further, the international investigations of the age composition expression of the age structure-crime pattern that were discussed in Chapter 4 indicated that retrospective analyses produced minimal evidence of age composition effects when they were conducted for short periods of time. It could be used, however, for a prospective age composition analysis. As the data could not otherwise be used for analysis of the age structure-crime pattern, and both the South Australian and Western Australian data can be used to analyse prospective age compositional change (which will allow for a comparison of regional variation), neither the age-crime nor age structure-crime patterns will be investigated for New South Wales in this thesis.

Victoria: Victorian apprehension data are released, primarily, by Victoria Police. *Victoria Police Crime Statistics* (1995-present) contains data pertaining to the annual number of offenders since the 1993/94 period. These data are organised by age, gender and offence, but age groups are not consistently organised over time, rendering the data inappropriate for the analyses. Moreover, after adjusting the data to calendar years (to fall in line with the organisation of the population data), the period of analysis would be very limited. An alternative set of apprehension data released by Victoria Police since 1995, *Provisional Crime Statistics*, was also unsuitable. Although data in this particular publication are organised by offence, the organisation of age is particularly limited (by adult/juvenile only), rendering the data inappropriate for all three stages of analysis.

Queensland: As for Victoria, the majority of data pertaining to apprehensions in the state of Queensland are released by its police department. In particular, *Annual Statistical Reviews* (1996-2005) have been released by Queensland Police Services for the post-1995/96 periods. Although the data are organised by age, gender and offence, they represent a narrower period of investigation than possible for either South or Western Australia and so were inappropriate for analysis of an investigation of either expression of the age structure-crime pattern. A prospective analysis of age composition effects could be conducted for Queensland, but the reliability of such would be infringed by the adjustment of the data to reflect a calendar year (as per the population data).

Tasmania: Tasmanian apprehension data is similarly collected and collated by the state's police department. The Department of Police and Public Safety (Tasmania) advised that the type of data required for the quantitative analyses are not publicly released.⁹ However, Tasmania Police subsequently agreed to release the required data if an official letter of request for data was submitted through the Tasmanian Institute of Law Enforcement Studies (TILES). Although such a letter was forwarded to TILES, the data request was not responded to.¹⁰

Northern Territory: Data for the Northern Territory are released primarily through the Office of Crime Prevention (Department of Justice, Northern Territory government). *Northern Territory Quarterly Crime and Justice Statistics* includes data for all levels of the criminal justice system. Apprehension data are organised by offence and region only (for a limited period of time that was inadequate for analysis), and lacked the essential age variable. Further, the Office of Crime Prevention advised that it would be unlikely that they could provide data organised around the required variables, and any such data would still pertain to a limited period. Northern Territory Police also advised that it was unable to assist with data

⁹ Sources of Tasmanian criminal justice data are outlined in *Crime Data Collection in Tasmania: A Register* (White and Willis 2003). This publication served as the foundation for the apprehension data search in relation to Tasmania, and can be referred to for additional details on the data collections described here.

¹⁰ Similarly, neither the Victorian nor Queensland Police Services responded to requests for data.

support. This organisation is only able to provide data held in its library catalogue, which did not hold a data collection(s) that was appropriate for any of the three stages of the analysis.

6.2 Strengths and Limitations of the Data

There are a number of benefits in using the OCSAR and CRC data collections in the proposed course of analysis for this thesis. The greatest advantage is that the data are organised by consistent age groupings, meaning that it does not need to be adjusted in the same way as much of the data used in prior studies (indicated in Chapter 4). This should assist in conducting more reliable analyses of the two expressions of the age structure-crime pattern. Both data sources are further organised by gender and offence, allowing for a more thorough assessment of the intricacies of the age structure-crime pattern (and hence potential variance in the association between age and crime).

There are, however, some limitations to the data. Both data sources pertain to a single state of Australia, so some of the numbers for specific (individual) offences are very small, and hence inadequate to conduct reliable analyses. Therefore, analyses will be conducted in relation to broad offence categories: offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion (further detail in this regard is included in sections B.1 and B.2 of Appendix B). It is possible that this approach may conceal some variation concerning the impact of structural change on offence trends. For example, Steffensmeier and Harer's (1987, 1991) analyses of the age composition expression of the age structure-crime pattern (discussed in Chapter 4) determined that all offences for a single category were not necessarily responsive to age composition effects at the same level.

The second disadvantage regarding the OCSAR and CRC data (for South Australia and Western Australia respectively) relates to the period of time for which it is available. In Chapter 1, the Australian 'baby boom' cohort was identified as that born

between 1946 and 1965, and the ‘baby bust’ cohort, between 1968 and 1974, while the age-crime pattern indicates that offence levels generally decline after 25 years of age. Therefore, because the OCSAR data commences in 1987 and the CRC data commences in 1994, it is unlikely that the analyses will be able to detect the impact of the movement of both cohorts in and out of the most crime prone ages. Similarly, the full impact of age composition effects on offence trends in South Australia may not be revealed in the standardisation analyses due to OCSAR introducing new counting rules in 1998, which means that the analyses have to be conducted over two discrete periods.

These data limitations resulted in a small number of refinements to this thesis’s proposed course of analysis outlined in previous chapters. These will be discussed in section 6.4 when the analytical framework is outlined.

6.3 Summary and Conclusions

Considerable effort was made to locate the data required for the application of this thesis’s proposed course of analysis. The analytical techniques for this framework (i.e. correlation analysis, cohort analysis, and comparative analysis) required two streams of data: population and apprehensions. Both streams need to be organised by matching age, sex, and state/territory, preferably for a long period of time; apprehension data also needs to be organised by offence.

Demographic data collections are of a high quality in Australia. The data are organised around the required variables, can be easily manipulated to reflect the organisation of the apprehension data in terms of age and state/territory, and are available for both past and projected populations.

By contrast, apprehension data collections in Australia are relatively limited. A national data collection relating to age-specific apprehension trends has only recently been initiated, which may be symptomatic of the absence of a singular definition of offences across Australia’s states and territories. Further, there appears to be a significant range in the quality of apprehension data collected (or at least released to

the public) by the individual states and territories. For example, the period of time for which data are available, and the level of detail in the data (such as the inclusion of an age variable, and whether the age variables that have been included are organised by small groups or simply into the two categories of adults and juveniles). Consequently, there is limited scope in this thesis for investigating regional variation in the experience of the age-crime and age structure-crime patterns, which was identified previously as a useful avenue of analysis due to regional variation in the pace of structural ageing. Similarly, the analyses cannot be conducted for as long a period as hoped, or at a detailed level with regard to offence-specific apprehensions. It was determined that South Australian and Western Australian data collections were the most comprehensive and internally consistent, and the quantitative analyses for this thesis are consequently restricted to these two regions.

6.4 Towards a Central Analytical Framework

Having identified the data available for addressing this thesis's proposed course of analysis (based on the analytical techniques discussed in Chapter 5 for investigation of the cohort density and age composition expressions of the age-structure crime pattern set out in Chapter 3, and the underlying nature of the age-crime pattern discussed in Chapter 2), this thesis's central analytical framework is as follows.

The distribution and correlation analyses discussed in Chapter 5, which are conducted to provide insight into the association between age and crime and as a measure of the strength of the relationship between age structure and crime, are performed for only South Australia and Western Australia, utilising the same age groupings and offence categories as those applied in the analyses of the cohort density and age composition expressions. These analyses form Chapter 7. Neither expression of the Easterlin hypothesis is explicitly addressed in this chapter. Rather, the purpose of Chapter 7 is to confirm or deny whether the age-crime and age structure-crime patterns are generally evident for the two regions being analysed. This includes an initial indication of whether the nature of these two associations appears to be variant or invariant.

The cohort analyses discussed in Chapter 5 are conducted as a means of indicating how birth cohort size and relative disadvantage influence cohort-specific apprehension trends (the cohort density expression). Cohort analyses form Chapters 8, 9, and 10, looking firstly at total apprehensions, followed by offence-specific apprehensions, and finally the set of apprehension trends for each cohort, for both males and females. This aspect of the analysis is restricted to Western Australia, being the only one of the two possible regions identified for analysis where age groups in the apprehension data have been grouped equally. The age groups pertain to four year periods; consequently, age-specific ratios will be observed in 1994, 1998, and 2002. These observation intervals allow for the offence trajectories of five birth cohorts to be examined. These are the cohorts born 1957-60, 1961-64, 1965-68, 1969-72, and 1973-76. The sizes of these five Western Australian birth cohorts (males and females) are included in Appendix B (section B.4).

The cohort density expression would be supported if the apprehension ratios for the Western Australian cohorts born 1969-72 and 1973-76 are seen to depart from the classic age-crime pattern between 1994 and 2002. That is, its ratios do not decline consistently as the cohorts have aged, suggesting an extended participation in criminal activity (i.e. beyond that suggested by the age-crime pattern). This is because the Western Australian birth cohorts born 1969-72 and 1973-76 are the most reflective of the period that relates to the Australian baby bust cohort (which was born between 1968 and 1974, and peaked in 1971). In this analysis, the former cohort can thus be regarded as a leading edge cohort, and the latter a lagging edge cohort. Accordingly, should the cohort born 1969-72 be seen to experience the greatest departures from the age-crime pattern, this would indicate that size *per se* is more influential than relative disadvantage with regard to cohort-specific apprehension trends, but vice versa if it is the cohort born 1973-76 that has experienced the most pronounced extension of involvement in criminal activity. Should these pivotal cohorts be seen to have experienced increasing apprehension rates as they aged, this can be regarded as evidence of variance in the age-crime pattern, as can any difference in such increases by gender or offence category (the small base for many specific offences making analysis of such unviable at this time).

Of the five Western Australian birth cohorts being analysed, those born 1957-60, 1961-64, and 1965-68 are the smallest. Therefore, we would expect that apprehension ratios for these smaller birth cohorts will be the most reflective of the age-crime pattern (i.e. ratios should generally decline as the cohort ages, indicating that the cohort has not experienced an extended period of offending). The cohort density expression would thus be negated if the apprehension ratios of the smaller Western Australian cohorts born 1957-61, 1960-64, and 1965-68 are more likely to depart from the age-crime pattern than those of the large Western Australian cohorts born 1969-72 and 1973-76.

Further, the cohort density expression would be regarded as plausible if either:

1. Both larger and smaller Western Australian birth cohorts have experienced increasing apprehension ratios as they aged between 1994 and 2002; or
2. Cohort-specific apprehension ratios for the five Western Australian birth cohorts suggest that a common period effect (such as a change in policing strategies) has impacted on all of their apprehension ratios between 1994 and 2002.

As suggested previously, departures from the age-crime pattern for this aspect of the analysis are categorised as being:

1. Significant if apprehension ratios have increased (by more than five per cent) as a cohort has aged;
2. Substantial if apprehension ratios have been relatively stable as a cohort has aged (either increasing or declining by less than five per cent); and
3. Minor if apprehension ratios show minimal change in the rate of decline as a cohort has aged (the rate of decline decelerating by more than one-quarter).

Importantly, as the sources of apprehension data do not include an unemployment variable (the life event featured in the analyses as a proxy variable for relative disadvantage), cohort-specific apprehension trajectories will be considered in light of Western Australian unemployment rates. These unemployment rates are reorganised from *Labour Force Status by Sex, Age, State, Marital Status* (ABS 2008a) to reflect

those experienced by male and female birth cohorts when first seeking entry to the workforce. These rates are graphed in Appendix B (section B.7).¹¹

The comparative analyses discussed in Chapter 5 (i.e. standardisation and decomposition analyses) are conducted as a means of measuring the impact of structural ageing on total apprehensions levels, both retrospectively and prospectively (the age composition expression). As the South Australian data are available for a longer period of time than the Western Australian data, the retrospective analyses are restricted to the former region. As suggested previously, the analyses are conducted over two separate periods (1987-1997 and 1998-2004) to account for the difference in counting rules. These analyses, which focus on the past influences of changing age composition on male and female apprehension trends (initially in relation to total apprehensions, and subsequently for offence-specific change), form Chapters 11 and 12. The age compositions of the South Australian population over these two periods are graphed in Appendix B (section B.5). However, to allow for a regional comparison of age compositional change, the prospective analyses will be conducted for both South and Western Australia (males and females), 2004-2051. These analyses form Chapters 13 and 14, and are similarly conducted first for total apprehensions, and subsequently for offence-specific apprehensions. The prospective age compositions of these two state-level populations are also graphed in Appendix B (section B.6).

The age composition expression would be supported if total apprehension levels in South Australia (1987-1997, 1998-2004, and 2004-2051) and Western Australia (2004-2051) have been (or should be) reduced by the ageing population composition. That is, apprehensions levels would have been higher than observed had the population not aged structurally.

¹¹ These figures have been annotated in accordance with the period of cohorts, and thus reflect four year age groupings. However, the original data are organised around five year age groupings.

Conversely, the age composition expression could be negated in one of two ways:

1. The ageing population composition has had no effect on total apprehension levels; or, more significantly,
2. Total apprehension levels have actually increased as a consequence of the ageing population composition. That is, apprehension levels would have been lower than observed had the population not have aged structurally.

Further to these specific propositions, should there be differences in the impact of age composition effects by gender or offence category, this would be indicative of variance in the underlying association between age and crime. Furthermore, some differences in the 'age' of the two regional populations being analysed could accordingly be expected to result in some differences in the regions' respective experiences of the age structure-crime pattern. South Australia is an older region, while Western Australia is a younger region (see Chapter 3).¹² Generally, therefore, it could be expected that:

1. Retrospective age composition effects will be greater for South Australia. This is because it is a substantially older population, and has been ageing structurally at a much greater rate than that of Western Australia; and
2. Prospective age composition effects will be greater for Western Australia. This is because the sub-national population has yet to really start ageing, and thus is also still growing strongly.

The quantitative analyses commence in the next chapter with an exploration of the age-crime and age structure-crime patterns in South Australia (1987-1997 and 1998-2004) and Western Australia (1994-2002).

¹² Assumptions underlying the ABS (2005b) population projections also differ by state. For South Australia the assumptions are: a TFR of 1.71 in 2004, falling to 1.66 in 2016 and then remaining constant; total net migration of 1,108 in 2004, rising to 1,350 by 2006 and then remaining constant; and life expectancy continuing to increase but at a decelerating rate. For Western Australia the assumptions are: a TFR of 1.75 in 2004, falling to 1.67 in 2021 and then remaining constant; total net migration of 14,906 in 2004, rising to 17,108 the following year and remaining constant thereafter; and life expectancy continuing to increase but at a decelerating rate.

Chapter Seven – The State of the Age-Crime and Age Structure-Crime Patterns in Australia

This chapter discusses a three stage exploratory analysis of apprehension patterns, the association between age and crime, and the association between age structure and crime for Western Australia (1994-2002) and South Australia (1987-2004). Assessment of apprehension patterns involves examining the apprehension distribution of the total population by offence category (offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion), and calculating both the contribution of the offence-specific apprehensions to total apprehensions, and the change in apprehension share for these offences, over time. Consideration of the age-crime pattern involves examining these same offence categories in relation to the proportion of offences linked to younger persons as a proportion of the total population, as well as the apprehension distribution for this particular age group. Investigation of the age structure-crime pattern involves comparing age group-specific change in population share (the size of age-specific groups as a proportion of the total population) with their apprehension share over the same periods, and finally correlating these changes at the offence level, to assess the strength of the relationship between the two.

7.1 Western Australia 1994-2002

This section focuses on Western Australian trends, 1994-2002. Apprehension data are drawn from the CRC *Crime and Justice Statistics for Western Australia* publications (1995-2003). Population data are drawn from the ABS's *Population by Age and Sex, Australian States and Territories* (2005a). The age group referred to as 'young' is that aged 18-25 years.

7.1.1 Apprehension Patterns (WA)

Apprehension levels in Western Australia fluctuated between 1994 and 2002 (Table 7.1.1.1). Numbers rose from 8,188 to 8,936 (despite the crude ratio of apprehension numbers to population numbers, per 100, declining from 0.68 to 0.64) – increasing across the total period by 9.5 per cent – with a decline in 1998.

In terms of offence-specific apprehension share, offences against the person present as the category with the highest level. In 2002, these accounted for close to half of all apprehensions (47 per cent), their share having increased by 8.9 per cent since 1994, notwithstanding a small decline (of 2.9 per cent) between 1998 and 2002.¹ The other offence category with a high level of apprehensions is offences against property (34 per cent in 2002). Although its apprehension share has also fluctuated over the period, it also accounts for the smallest decline in apprehension share (4.3 per cent).

Table 7.1.1.1: Distribution (%) of Apprehensions, Western Australia 1994-2002, by Offence.

	Percentage			Change (%)		
	1994	1998	2002	1994-1998	1998-2002	1994-2002
Against Property	35.6	31.7	34.1	-11.1	7.7	-4.3
Against the Person	42.8	47.9	46.6	12.1	-2.9	8.9
Fraud and Misappropriation	12.7	11.3	11.1	-10.7	-1.7	-12.2
Sexual Offences	6.5	6.0	5.1	-7.8	-15.3	-21.9
Robbery and Extortion	2.4	3.1	3.1	27.9	2.0	30.5
Total	100.0	100.0	100.0	...	...	...
N	8,188	7,840	8,963	-4.3	14.3	9.5

Source: Calculated by author from CRC (1995-2003).

Robbery and extortion offences represent the lowest share of all apprehensions (3.1 per cent in 2002). Such apprehensions represent the greatest level of change over the 1994-2002 period, an increase of 30 per cent, although the level of change between 1994 and 1998, and 1998 and 2002 (28 and 2.0 per cent respectively) would suggest that the pattern may have stabilised. Sexual offences also represent a low level of apprehension share (5.1 per cent in 2002), but have declined over time (by 22 per cent, being the highest level of decline in apprehension share). However, these large

¹ Change over time is calculated as the difference in the proportion of the respective measure at the beginning and end of the period, and what proportion of the earliest observation that this difference represent.

increases and declines will in part reflect the small base of both robbery and extortion, and sexual offences.

Fraud and misappropriation is in the middle of the distribution in terms of share (11 per cent in 2002), and similarly has declined.

Overall then, three offence categories (offences against property, fraud and misappropriation, and sexual offences) experienced a decline in share over the period 1994-2002, while two (offences against the person, and robbery and extortion) experienced growth. The most stable offence category over this time has – reflecting widely-held perceptions of the age-crime pattern – been that with the youngest age distribution of offenders (see below).

7.1.2 The Age-Crime Pattern (WA)

The proportion of total apprehensions attributed to persons aged 18-25 years for Western Australia (relative to all other age groups combined), across the 1994-2002 period, provides clear evidence of an age-crime pattern (see Table 7.1.2.1). This age group committed just over half (51 per cent) of all crimes in 1994. However, while the 18-25 year age group still dominates apprehension levels across the eight year period, their apprehension share fell to 41 per cent in 2002 (by almost 19 per cent), or approximately two-fifths of all apprehensions. This trend suggests that the strength of the age-crime pattern may be diminishing. In other words, the proportion of apprehensions accounted for by young persons is declining at the same time as a shift upwards in the age of offenders would appear to be occurring.

The share of apprehensions across offence categories for 18-25 year olds (see Table 7.1.2.1) also reflects this overall picture of a diminishing age-crime pattern. The greatest apprehension share of any offence category for 18-25 year olds is robbery and extortion. In 1994 and 2002, people of this age committed 68 and 61 per cent respectively of all such offences. This represents a decline of 10 per cent over the period.

Table 7.1.2.1: Percentage of All Apprehensions, Western Australia 1994-2002, by Offence, Persons Aged 18-25 Years.

	Percentage			Change (%)		
	1994	1998	2002	1994-1998	1998-2002	1994-2002
Against Property	65.6	60.9	51.0	-7.2	-16.1	-22.2
Against the Person	43.7	40.0	35.9	-8.5	-10.2	-17.8
Fraud and Misappropriation	44.3	39.6	37.7	-10.7	-4.7	-14.9
Sexual Offences	23.7	22.8	22.9	-3.9	0.4	-3.5
Robbery and Extortion	67.9	71.3	61.1	5.0	-14.3	-10.0
Total	50.9	46.5	41.4	-8.6	-10.9	-18.6

Source: Calculated by author from CRC (1995-2003).

Table 7.1.2.1 also indicates that the 18-25 year age group accounted for a similarly large share of apprehensions for offences against property. Equally noteworthy is that this share also declined dramatically (by 22 per cent) between 1994 and 2002, from 66 to 51 per cent. This change in apprehension share represents the greatest level of change across the apprehension categories. Change in apprehension share for the remaining four offence-specific apprehensions ranges from -3.5 per cent (sexual offences, also the offence category for which 18-25 year olds account for the lowest share of apprehensions) to -18 per cent (offences against the person) for the same period, with all offence categories experiencing a decline in apprehension share between 1994 and 2002.

Furthermore, the decline in share of offences against property appears to be accelerating. Change in apprehension share for this offence category more than doubled across the 1994-1998 and 1998-2002 periods (from -7.2 per cent to -16 per cent). At the same time, some offences were experiencing opposite trends; namely, fraud and misappropriation (-11 per cent and -4.7 per cent respectively) and sexual offences (-3.9 per cent and 0.4 per cent respectively). As official crime statistics consistently indicate that offence against property are most commonly committed by young persons, and have a younger age distribution of offenders than other offences, these are all findings of importance to this thesis.

As was indicated for their share of all apprehensions, 18-25 year olds have also experienced fluctuations in their overall apprehension levels over time (Table 7.1.2.2). The number of apprehensions for this group was greatest in 1994 (N = 4,166), and somewhat lower in both 1998 and 2002 (N=3,645 and N = 3,712),

declining by 11 per cent across the total period. Incidentally, change in these apprehension levels also indicate that the proportion of young persons who are apprehended has declined over the period of analysis (from a ratio of 1.93 to 1.71 per 100 persons at these ages), which is again suggesting that the age distribution of offenders may be shifting upwards.

Table 7.1.2.2: Distribution (%) of Apprehensions, Western Australia 1994-2002, by Offence, Persons Aged 18-25 Years.

	Percentage			Change (%)		
	1994	1998	2002	1994-1998	1998-2002	1994-2002
Against Property	36.8	41.3	40.4	12.2	-2.1	9.9
Against the Person	45.9	41.5	42.0	-9.8	1.4	-8.5
Fraud and Misappropriation	11.1	9.7	10.2	-12.7	5.2	-8.2
Sexual Offences	3.0	2.9	2.8	-2.9	-4.6	-7.4
Robbery and Extortion	3.2	4.7	4.6	46.9	-1.8	44.3
Total	100.0	100.0	100.0	...	...	...
N	4,166	3,645	3,712	-12.5	1.8	-10.9

Source: Calculated by author from CRC (1995-2003).

For the entire 1994-2002 period, the majority of apprehensions amongst 18-25 year olds related to offences against property and offences against the person (in 2002, 42 and 40 per cent respectively). However, these two offence categories experienced different directions in change in apprehension share for the same period, with apprehensions for offences against the person falling by 8.5 per cent, but growing for offences against property by 9.9 per cent.

Both sexual offences, and robbery and extortion, account for a small percentage of all apprehensions amongst 18-25 year olds (2.8 and 4.6 per cent respectively in 2002). Despite the greatest level of change in apprehension share has occurred for robbery and extortion, increasing by over 44 per cent between 1994 and 2002 (although it would appear that change for this particular offence category also slowed, actually declining between 1998 and 2002), this may be a reflection of its low base.

The distribution of offence-specific apprehensions for 18-25 year olds for the total 1994-2002 period is indicating, therefore, that apprehension share fell for three offence categories (offences against the person, fraud and misappropriation, and

sexual offences) but increased for two (offences against property, and robbery and extortion). Further, change in apprehension share for the 1994-1998 and 1998-2004 periods suggests that for all but one offence category (sexual offences), the direction of change in apprehension share has differed over time, and at the same time, the level of change experienced has slowed. For example, apprehension share for offences against property rose by 12 per cent over the earlier period, but subsequently declined by 2.1 per cent.

Overall, these findings are suggesting that structural ageing may be influencing offence trends. In terms of the nature of the age-crime pattern, the association appears to be invariant, but only in so far as 18-25 year olds continue to account for the majority of apprehensions for the Western Australian population, and that, as a distinct group, they have been apprehended for the same offences (more or less) across the analysis. However, the age-crime pattern cannot be regarded as rigidly invariant. The share of apprehensions for 18-25 year olds not only declined over the total period, but periods of increase and decline in their share of offence-specific apprehensions are equally observed.

7.1.3 The Age Structure-Crime Pattern (WA)

Changes in both the population and apprehension share by age group across the period 1994-2002, for Western Australia, are given in Table 7.1.3.1. Results are organised around the same intervals at which observations of age-specific apprehension rates of birth cohorts are made later (in Chapters 8, 9, and 10), being 1994, 1998, and 2002.

Between 1994 and 2002, the Western Australian population has aged structurally. That is, there has been a decline in the proportion of each age group between 18 and 45 years of age, and an increase for those aged 46-80 years.

The distribution of persons apprehended also appears to have aged over this time, although not quite as strongly. Apprehension share for 18-21 and 22-25 years declined (by 20 and 17 per cent respectively), but it has increased for each age group between 26 and 80 years of age (as little as 4.4 per cent at 34-37 years, but as much

Table 7.1.3.1: Population and Apprehension Distributions (%), Western Australia 1994-2002, Total Apprehensions, by Age-Group.

	Population Distribution			Apprehension Distribution			Change in Population Share (%)			Change in Apprehension Share (%)		
	1994	1998	2002	1994	1998	2002	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	8.5	7.9	7.9	30.3	26.4	24.3	-7.9	0.8	-7.1	-12.8	-7.8	-19.6
22-25	9.2	8.3	7.5	20.6	20.1	17.1	-9.7	-10.4	-19.1	-2.4	-15.0	-17.1
26-29	8.6	8.9	7.7	14.2	15.2	15.6	3.2	-13.0	-10.3	6.9	2.6	9.7
30-33	9.4	8.5	8.5	10.7	11.5	14.1	-10.3	1.0	-9.4	7.3	22.1	31.0
34-37	9.2	9.1	8.2	8.5	8.9	8.9	-1.1	-10.2	-11.2	4.7	-0.4	4.4
38-41	9.0	8.9	8.8	5.8	6.4	7.2	-1.3	-0.9	-2.2	9.7	13.8	24.9
42-45	8.5	8.5	8.5	3.6	4.0	4.7	0.4	-0.8	-0.4	9.7	16.8	28.1
46-80	37.5	39.9	42.9	6.2	7.5	8.1	6.5	7.4	14.4	21.1	8.1	30.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

as 31 per cent at 30-33 and 46-80 years). Furthermore, decline in apprehension share for the two youngest age groups, and growth in apprehension share for all but one older age group (34-37 years), is indicated over both the 1994-1998 and 1998-2002 periods. Regardless of the direction of change, however, each experienced considerable fluctuation in level of change. In particular, apprehension share for 30-33 year olds increased three-fold between the earlier and latter periods (from 7.3 to 22 per cent), while it declined by almost two-thirds for 46-80 year olds (from 21 to 8.1 per cent).

For persons aged 18-25 years, decline in the apprehension share has thus occurred at the same time as they have declined as a proportion of the total population, which would seem intuitively correct. By contrast, persons aged 26-45 years have experienced an increase in their total apprehension share at the same time as their population share has also declined. Only persons aged 46-80 years have increased both their population and apprehension shares. What this means is that as the population and apprehension shares for persons aged 18-25 years have declined, a concomitant increase in the apprehension share for all other groups, irrespective of their change in population share, has occurred.

The above argument is further confirmed when the Pearson's Correlation Coefficient (' r ') is applied to the data (changes in population and apprehension share from Table 7.1.3.1). If the percentage of younger persons in a population declines at the same time as crime levels, this would be a positive correlation. A strong positive r of 0.64 is generated for total apprehensions between 1994 and 2002 (Table 7.1.3.2), with an even stronger positive relationship ($r = 0.72$) for the period 1994-1998, and a quite strong relationship ($r = 0.49$) for the period 1998-2002.² This indicates that the age distribution of (known) offenders changed in a similar manner to the age distribution of the population, albeit not in the generally linear manner suggested by structural ageing. That is, the variation in the value of r over time appears to be strongly associated with the coincidence of population and apprehension share change,

² Significance tests for the correlation analyses are not provided because I use population-level data. It is noted, however, that because the correlations are based on a small number of observations, the results need to be approached with caution and are suggestive only.

supporting the argument that structural ageing is driving a shift in the age of persons being apprehended and apprehension levels, but the correlation is not perfect. It could, for example, be affected by differences in the type of offence committed by each age group.

Table 7.1.3.2: Correlation between Changes in Apprehension and Population Age Structures, Western Australia 1994-2002, by Offence.

	Pearson's Coefficient Correlation		
	1994-1998	1998-2002	1994-2002
Against Property	0.19	0.19	0.27
Against the Person	0.69	0.63	0.88
Fraud and Misappropriation	0.51	0.14	0.76
Sexual Offences	0.33	0.69	0.46
Robbery and Extortion	0.69	-0.04	-0.03
Total	0.72	0.49	0.64

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Indeed, when we turn to the correlation between specific offence categories and population share shown in Table 7.1.3.2 (see Appendix C, section C.1, for the data that has been correlated in this table), we find that the r for each offence category differs substantially in strength, and alters over time. For example, for the total 1994-2002 period, the r for robbery and extortion shows no relationship ($r = -0.03$), while that for the four other offence categories ranges from a moderate positive 0.27 (offences against property) to a very strong positive 0.88 (offences against the person). Across the 1994-1998 period, all r 's are positive and range from a weak 0.19 (offences against property) to a strong 0.69 (offences against the person, and robbery and extortion). For the 1998-2002 period, four r 's are positive, ranging from a weak 0.14 (fraud and misappropriation) to a strong 0.69 (sexual offences), while the r for robbery and extortion shows no relationship.

These findings suggest that as structural ageing has progressed (that is, that the movement of large birth cohorts through the life course has caused the population share of younger people to decline, but that for older people to increase), there has been a concomitant – and in several cases strongly associated – movement in the proportion of each type of offence committed by older people, for all but robbery and extortion. However, for four offence categories, the correlations are less strong for

the 1998-2002 period than for the 1994-1998 period, which is inconsistent with the generally unilineal progression of structural ageing. The indication is, therefore, that while offending has generally moved upwards to older age groups, it is strongest for sexual offences and, to a lesser extent offences against property. This suggests underlying variation in the age distribution of offenders by offence category. It is also indicates a possible 'class' of offenders who are growing older – in other words there are potential cohort effects that are variant. Therefore, like the age-crime pattern by offence, the age structure-crime pattern cannot be regarded as rigidly invariant.

7.1.4 Summary (WA)

Consideration of total apprehension trends (section 7.1.1) demonstrated that the majority of apprehensions in Western Australia are for offences against the person, followed by offences against property. Across the total 1994-2002 period, apprehensions for offences against the person, and robbery and extortion offences increased, while apprehensions for sexual offences, offences against property, and fraud and misappropriation declined. The level of change in apprehension share has also fluctuated, both within and across offence categories, the highest levels of change indicated for robbery and extortion, and sexual offences.

Although the age-crime pattern was clearly visible, it did not present as straightforward (i.e. neither variant nor invariant), and its strength appears to be waning (section 7.1.2). Between 1994 and 2002, persons aged 18-25 years accounted for never more than 17.7 per cent of the total population but for never less than 40 per cent of all apprehensions. However, the proportion of Western Australian apprehensions occurring at the ages of 18-25 years is becoming less concentrated. In fact, for persons aged 18-25 years between 1994 and 2002, a decline in the share of Western Australian apprehensions is evidenced for all five offence categories. In particular, apprehensions for offences against property (which account for a large majority of offences for this age group) declined by over one-fifth. There is also variability in the apprehension patterns of 18-25 year olds. Most importantly, the two offence categories that account for the majority of apprehensions amongst young Western Australians (offences against the person, and offences against property) first

reduced and then increased their share of apprehensions for this age group between 1994 and 2002.

Moreover, the trends are associated with an upwards shift in the age profile of offenders. Examining the age structure-crime pattern for persons aged 18-25 years between 1994 and 2002 (section 7.1.3) indicates that the decline in apprehension share has occurred simultaneously with a decline in their share of the population. However, all other age groups showed an increase in apprehension share regardless of change in population share (for example, 26-45 year olds show a decline in population share, and 46-80 year olds an increase in population share). Correlating change in the total population age structure with total apprehensions for 1994-2002 produced a strong positive correlation. Conversely, a range of correlations (from no relationship to very strong positive) was generated in relation to each individual offence category for the same period. Of particular note is that offences against property generated a much weaker correlation than did offences against the person.

In sum, there is strong evidence that the age-crime pattern is diminishing, with such change being associated with demographic change. There is also evidence of an extension in participation in criminal activity (i.e. cohort effects), with offence trends shifting upwards. Findings further show that this trend is not homogenous across offence categories. In these respects, the age-crime pattern in Western Australia between 1994 and 2002 appears to have been both invariant and variant, and the age structure-crime effect – which the analyses are also suggesting was operational – may be a potential source of some of this variance.

7.2 South Australia 1987-2004

This section undertakes a similar analysis for South Australia. The relationships are examined for two discrete periods – 1987-1997 and 1998-2004; this is because of differences in the counting rules in the apprehension data across these two periods (discussed in Chapter 6). To overcome the difference in the span of time for these two periods, the data have been annualised (i.e. ‘change’ refers to the annual average

for each period). The apprehension data were accessed from the *Crime and Justice in South Australia* reports released by OCSAR (1988-2005). As for the section on Western Australia, the population data utilised are drawn from the ABS's *Population by Age and Sex, Australian States and Territories* (2005a). However, the 'young' age group here is that aged 18-24 years, reflecting the differing data collection categorisations.

7.2.1 Apprehension Patterns (SA)

Table 7.2.1.1 indicates significant fluctuations in South Australian apprehension levels. Between 1987 and 1997, numbers increased dramatically from 13,416 to 24,292 (by 8.1 per cent annually, and from a ratio of 1.3 to 2.2 apprehensions per 100 of the population). The level of change was less dramatic over the 1998-2004 period, and changed direction, falling from 21,968 apprehensions to 18,617 (by 2.5 per cent annually; from a ratio of 2.0 to 1.6).

Table 7.2.1.1: Distribution (%) of Apprehensions, South Australia 1987-1997 and 1998-2004, by Offence.

	Percentage				Annualised Change (%)	
	1987	1997	1998	2004	1987-1997	1998-2004
Against Property	62.9	45.0	54.4	58.7	-2.8	1.3
Against the Person	25.3	25.0	27.3	28.7	-0.1	0.9
Fraud and Misappropriation	8.2	26.6	14.6	8.1	22.6	-7.4
Sexual Offences	2.3	2.1	2.0	3.0	-0.9	7.8
Robbery and Extortion	1.3	1.2	1.7	1.5	-0.5	-2.0
Total	100.0	100.0	100.0	100.0	...	...
N	13,416	24,292	21,968	18,617	8.1	-2.5

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

The offence category exhibiting the highest level of apprehensions in South Australia over the periods of analysis was – in contrast to Western Australia – offences against property (see Table 7.2.1.1). Offences against property accounted for 63 per cent of all South Australian apprehensions in 1987, and 59 per cent in 2004 (these proportions were similarly dominant in 1997 and 1998). Against the person offences also account for a large proportion of all offences (between 25 and 29 per cent of respective apprehensions in 1987 and 2004). Annualised change shows that while

there was some fluctuation in apprehension share for these two offence categories (which, combined, accounted for the majority of apprehensions in Western Australia), they were in fact relatively stable.

The offence categories exhibiting the lowest share of apprehension levels are robbery and extortion, and sexual offences (1.3 and 1.5 per cent, and 2.3 and 3.0 per cent, in 1987 and 2004 respectively) (as were they in Western Australia). Similarly, both offence categories experienced minimal annual decline in apprehension share between 1987 and 1997 (by 0.5 and 0.9 per cent respectively), while across the period 1998-2004, sexual offences increased by 7.8 per cent, and robbery and extortion fell by 2.0 per cent. However, again these changes will in part reflect the low base number/proportion for these offence categories.

As similarly occurred for Western Australia, the share of South Australian apprehensions for fraud and misappropriation sits approximately in the middle of the distribution. However, in South Australia, its apprehension share fluctuated more than any other offence category, growing by almost 23 per cent annually between 1987 and 1997 – which, incidentally, is the only case of increase for that period. It then declined by 7.4 per cent annually between 1998 and 2004.

7.2.2 The Age-Crime Pattern (SA)

Relative to all other age groups combined, persons aged 18-24 years accounted for a sizeable proportion of total apprehensions in South Australia across the 1987-1997 and 1998-2004 periods (see Table 7.2.2.1), again providing considerable support for the age-crime pattern. However, as was the case for Western Australia, the strength of this pattern is diminishing. The young age group, which accounted for 45 and 33 per cent of all apprehensions in South Australia in 1987 and 2004 respectively, reduced its proportion of all apprehensions over both periods (by 2.1 and 2.3 per cent respectively). That is, a concomitant decline in the proportion of total apprehensions accounted for by young persons and, by extrapolation, increase in the proportion accounted for by older persons, has occurred.

Table 7.2.2.1 also shows that the offence-specific apprehension shares of 18-24 year olds (as a proportion of all South Australian offence-specific apprehensions) have, in every case, declined, which further suggests a weakening of the age-crime pattern.

Table 7.2.2.1: Percentage of All Apprehensions, South Australia 1987-1997 and 1998-2004, by Offence, Persons Aged 18-24 Years.

	Percentage				Annualised Change (%)	
	1987	1997	1998	2004	1987-1997	1998-2004
Against Property	47.3	42.9	41.5	34.9	-0.9	-2.6
Against the Person	44.3	31.7	31.4	30.5	-2.8	-0.4
Fraud and Misappropriation	36.6	28.2	35.4	26.2	-2.3	-4.3
Sexual Offences	22.7	17.0	18.5	16.7	-2.5	-1.7
Robbery and Extortion	60.6	51.5	63.0	46.5	-1.5	-4.4
Total	45.3	35.8	37.7	32.6	-2.1	-2.3

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

Robbery and extortion presents as the offence category for which persons aged 18-24 years account for the greatest share (as for young Western Australians); 61 and 47 per cent of all such apprehensions in 1987 and 2004. However, the decline in these proportions is substantial. A large proportion of apprehensions at this age also relate to offences against property, offences against the person, and fraud and misappropriation (47, 44, and 37 per cent of respective apprehensions in 1987, and 35, 31, and 26 per cent in 2004). In each case, these shares have declined. While young persons were least likely to account for sexual offences in South Australia (23 per cent of all such apprehensions in 1987, and 17 per cent in 2004), these too have experienced a decline in share.

Annual decline in offence-specific apprehension shares ranged from 0.9 per cent (offences against property) to 2.8 per cent (offences against the person) between 1987 and 1997, and from 0.4 per cent (offences against the person) to 4.4 per cent (robbery and extortion) between 1998 and 2004. Further, the level of decline fluctuated for each offence category, accelerating for three offence categories and decelerating for two. The most significant of these changes relate to robbery and extortion, offences against property, and offences against the person. Annual decline in apprehension share trebled across the periods for robbery and extortion (from -1.5

per cent for 1987-1997, to -4.4 per cent for 1998-2004), and offences against property (from -0.9 per cent to -2.6 per cent), and fell to one-seventh of its 1987-1997 level for offences against the person.

Overall, therefore, while 18-24 year olds have accounted for a significant proportion of all offence-specific apprehensions, these shares have also reduced by a substantial margin. These are important findings, and, as was indicated for Western Australia, confirm a diminishing of the age-crime pattern.

The young age group has also experienced some significant changes in relation to its own (internal) apprehensions levels and distributions. The level of change was similar across both the 1987-1997 and 1998-2004 periods (around 4.5 per cent), but occurred in different directions (Table 7.2.2.2). Overall, numbers increased from 6,074 to 8,689 between 1987 and 1997 (from a ratio of 3.83 to 6.18 per 100 persons aged 18-24 years), but declined from 8,292 to 6,067 between 1998 and 2004 (from a ratio of 6.02 to 4.18).

Table 7.2.2.2: Distribution (%) of Apprehensions, South Australia 1987-1997 and 1998-2004, by Offence, Persons Aged 18-24 Years.

	Percentage				Annualised Change (%)	
	1987	1997	1998	2004	1987-1997	1998-2004
Against Property	65.8	54.0	59.9	62.9	-1.8	0.9
Against the Person	24.7	22.2	22.7	26.9	-1.0	3.1
Fraud and Misappropriation	6.6	21.0	13.6	6.5	21.8	-8.8
Sexual Offences	1.2	1.0	1.0	1.5	-1.3	8.9
Robbery and Extortion	1.7	1.8	2.8	2.1	0.2	-4.1
Total	100.0	100.0	100.0	100.0	...	...
	6,074	8,689	8,292	6,067	4.3	-4.5

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

As opposed to their share of all offence-specific apprehensions relative to the total South Australian population, apprehensions within the 18-24 year age groups are not distributed as evenly across the five offence categories. Rather, apprehensions for offences against property are by far the most common amongst this age group. Sixty-six per cent of apprehensions for 18-24 year olds in 1987, and 63 per cent in 2004, were for offences against property. This was the only offence category to experience

a reasonably stable apprehension share over the 1998-2004 period (increasing 0.9 per cent annually), although it had declined significantly over the 1987-1997 period (1.8 per cent annually).

As was also shown for Western Australia, much lower apprehension levels are indicated for sexual offences, and robbery and extortion, amongst South Australians aged 18-24 years. These offence categories accounted for 1.2 and 1.7 per cent respectively of their apprehensions in 1987, and 1.5 and 2.1 per cent in 2004. However, greater annual change in apprehension share is indicated between 1998 and 2004. Sexual offences increased its share by 8.9 per cent annually, while robbery and extortion reduced its share by 4.1 per cent annually. In both cases, these changes went in the opposite direction to the period 1987-1997, when annual change for sexual offences declined by 1.3 per cent, and for robbery and extortion increased by 0.2 per cent.

Fraud and misappropriation is again in the middle of the distribution (6.5 per cent in 2004), but the offence category experienced the greatest change in apprehension share for the 1987-1997 period, being an annual increase of almost 22 per cent.

Overall, for persons aged 18-24 years, three offence categories experienced a decline in apprehension share between 1987 and 1997 in South Australia (offences against property, offences against the person, and sexual offences), and two (fraud and misappropriation, and robbery and extortion) experienced decline between 1998 and 2004. Together, these account for all five offence categories. Hence, although there is no consistent pattern in the direction of change across offence categories, each has experienced fluctuations in apprehension share.

7.2.3 The Age Structure-Crime Pattern (SA)

Table 7.2.3.1 presents changes for South Australia for the periods 1987-1997 and 1998-2004 in relation to population and apprehension share by age group. Results are organised around the same age groups to be utilised in the later comparative analyses in Chapters 11 to 14.

Table 7.2.3.1: Population and Apprehension Distributions (%), South Australia 1987-1997 and 1998-2004, Total Apprehensions, by Age Group.

	Population Distribution				Apprehension Distribution				Change in Population Share (%)		Change in Apprehension Share (%)	
	1987	1997	1998	2004	1987	1997	1998	2004	1987-1997	1998-2004	1987-1997	1998-2004
18-19	4.5	3.6	3.5	3.8	17.3	11.9	13.6	11.7	-2.2	1.1	-3.1	-2.3
20-24	11.3	9.4	9.1	9.1	28.0	23.8	24.1	20.9	-1.7	-0.1	-1.5	-2.2
25-34	22.7	20.3	20.0	17.7	29.2	35.1	37.2	34.9	-1.1	-1.9	2.0	-1.0
35-44	19.9	21.0	21.0	19.9	12.5	18.1	17.0	22.3	0.5	-0.8	4.5	5.2
45-59	20.6	24.5	25.1	27.7	8.1	9.0	6.3	8.2	1.9	1.8	1.2	5.2
60-80	20.9	21.2	21.3	21.8	4.9	2.0	1.7	2.0	0.2	0.4	-6.0	2.1
Total	100	100	100	100	100	100	100	100	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

With regard to the South Australian age distribution, Table 7.2.3.1 indicates that, as was shown for Western Australia, the population has aged structurally, with a general decline in proportions at the younger ages, and increase at older ages. However, this has not been entirely consistent over time; between 1998 and 2004, the share of 18-19 year olds increased slightly, while the share of 35-44 year olds fell slightly.

Changes in apprehension share follow a similar pattern, indicating a (mostly) upwards shift in the age of offenders. While the apprehension share for people at younger and older ages has declined, it has generally increased for the middle age groups (between 25 and 59 years). The two youngest age groups experienced annual decline in their apprehension share across both the 1987-1997 and 1998-2004 periods, ranging from 1.5 per cent (20-24 years) to 3.1 per cent (18-19 years) (both between 1987 and 1997). Similarly, an annual increase in apprehension levels at ages 35-44 and 45-59 years is shown across both periods, ranging from 1.2 per cent (25-44 years, between 1987 and 1997) to 5.2 per cent (both age groups, between 1998 and 2004). The remaining age groups have experienced change in both directions, but by 1998-2004, apprehension share declined for the three youngest age groups, while it increased for the three oldest age groups. This is consistent with the findings for Western Australia, and again provides evidence for an ageing distribution of offenders.

Some age groups, however, experienced significant fluctuation in level of change (regardless of the direction of change). For 45-59 year olds, for example, apprehension share increased four-fold between the earlier and later periods, from 1.2 to 5.2 per cent (i.e. from 8.1 per cent of apprehensions in 1987 to 9.0 per cent in 1997, and from 6.3 per cent in 1998 to 8.2 per cent in 2004). Change decelerated, however, by one-half for 25-34 year olds from 2.0 to -1.0 per cent, and by two-thirds for 60-80 year olds, from -6.0 to 2.1 per cent.

In general, a decline in apprehension share for 18-34 year olds has thus occurred at the same time as persons of this age have experienced a decline in population share. By contrast, 35-80 year olds have mostly increased both their apprehension and

population share. Hence, and as was indicated for Western Australia, as apprehension and population shares at the younger ages have declined in South Australia, they have increased at the older ages. However, a concomitant decline in apprehension and population share is indicated over both the 1987-1997 and 1998-2004 periods for 20-24 year olds only, while a concomitant increase over the earlier and later periods is indicated for 45-59 year olds only.

This apparent evidence of an association between age structure and crime is again supported by the Pearson's Correlation Coefficient (' r '). The r for total apprehensions, based on changes in population and apprehension share from Table 7.2.3.1, suggests a moderate positive relationship ($r = 0.33$) for the 1987-1997 period, and a weak positive relationship ($r = 0.20$) for the period 1998-2004 (Table 7.2.3.2). This indicates that there has been some similarity between change in the aggregate age distribution of recorded crime and population by age in South Australian (although not as strong as was indicated for Western Australia). Thus, structural ageing is again associated with an upward shift in total offence patterns (or a diminishing of the age-crime pattern), but again the correlation is not perfect.

Table 7.2.3.2: Correlation between Changes in Apprehension and Population Age Structures, South Australia 1987-1997 and 1998-2004, by Offence.

	Pearson's Correlation Coefficient	
	1987-1997	1998-2004
Against Property	-0.17	0.15
Against the Person	0.83	0.31
Fraud and Misappropriation	0.90	0.06
Sexual Offences	0.96	0.44
Robbery and Extortion	0.79	-0.85
Total	0.33	0.20

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

In terms of individual offence categories, it is evident from Table 7.2.3.2 (see Appendix C, section C.2, for the data that is correlated here) that the r for each varies substantially in the strength and direction of the correlation (between population and offence-specific apprehension share), and alters over time (and many of the offence-

specific correlations are stronger than those generated for Western Australia). Between 1987 and 1997, the r for offences against property shows a weak negative relationship ($r = -0.17$), while that for the other four offence categories are very strong positive, ranging from a 0.79 (robbery and extortion) to a 0.96 (sexual offences). Variation in r is more distinct between 1998 and 2004. Three r 's are positive for the 1998-2004 period, ranging from a weak 0.15 (offences against property) to a moderate 0.44 (sexual offences). Conversely, the r for robbery and extortion is negative and very strong ($r = -0.85$), while no relationship is indicated for fraud and misappropriation ($r = -0.06$).

These findings suggest that the progression of structural ageing has generally been concomitant with a growing proportion of older persons being apprehended (except robbery and extortion), and that this association is very strong in some cases. However, the correlations are (mostly) less strong for the 1998-2004 period than for the 1987-1997 period, which is inconsistent with the unilineal process of structural ageing (but consistent with the findings for Western Australia). Thus, while the association between structural ageing and crime is a little stronger for offences against the person, and sexual offences, other offence trends have more generally moved upwards to older age groups, indicating potential cohort effects that are variant. Consequently, the age structure-crime pattern cannot be regarded as rigidly invariant (which may be indicative of differences in offence-specific ages of offenders).

7.2.4 Summary (SA)

In South Australia, offences against property dominated apprehensions across the 1987-1997 and 1998-2004 periods (Section 7.2.1). Offence-specific apprehension levels were just as likely to fall as to increase. All but one offence category (offences against the person) indicated fluctuations in the level of change encountered.

The proportion of apprehensions accounted for by young South Australians, relative to the total population, reflects the age-crime pattern (Section 7.1.2). Between 1987 and 2002, 18-24 year olds never accounted for more than 15.8 per cent of the total population, yet never accounted for less than 33 per cent of all apprehensions; their

offence-specific apprehension shares, however, fell dramatically. In addition, a variant distribution of apprehensions for 18-24 year olds was indicated, with apprehension share for all offence categories experiencing periods of increase and decline, including some notable levels of annual change. Interestingly, the level of change indicated at this age for offences against property as well as offences against the person (which account for the majority of their apprehensions) was (mostly) lower than that suggested for other offence categories. Therefore, for the periods 1987-1997 and 1998-2004 in South Australia, the dynamic between age and crime, which is weakening, would appear to be both variant and invariant.

More importantly, an upward shift in the age distribution of South Australian offenders is associated with apprehension trends across the 1987-1997 and 1998-2004 periods. Apprehension and population share for 18-34 year olds has (mostly) declined at the same time as shares for 35-80 years olds have (mostly) increased. Correlating the change in the total population age structure with apprehensions generated (mostly) positive r values, which were stronger at the disaggregate level than the aggregate level (particularly between 1987 and 1997). Of particular note, offences against property (again) generated weaker correlations than other offence categories.

In sum, the findings show a diminishing age-crime pattern, which appears to be associated with structural ageing. There is also an indication of cohort effects, with offence trends shifting upwards (and thus beyond the young crime-prone ages). The variations in offence-specific findings, however, indicate that this is not a homogenous trend. In these respects, the age-crime pattern in South Australia between 1987 and 2004 appears to be both invariant and variant, which may, in part, be driven by age structure-crime effects.

7.3 Summary and Conclusions

This chapter has provided insight into the association between age and crime, and structural ageing and crime, for Western Australia, 1994-2002, and South Australia,

1987-2004. While findings across the two regions cannot be directly compared due to organisational differences in the data, it would appear that the same key trends emerge across the analyses:

1. Young persons account for the majority of apprehensions, providing evidence of the age-crime pattern.
2. Young persons' share of all apprehensions, however, is declining. Some change in their distribution of apprehensions is also indicated. Both of these trends appear to be variable by offence (for example, the level of change in young persons' share of all offences against property seems to be more substantial than change in their own proportion of the same offence-specific apprehensions). These findings thus suggest that the age-crime pattern is diminishing and, subsequently, that the age-crime pattern is not rigidly invariant.
3. Apprehension trends show an upward shift in the age distribution of offenders. Apprehension and population share has declined more or less simultaneously at the younger ages, but increased more or less simultaneously at the older ages. However, correlating change in total population age structure with change in apprehension levels indicates that the association is variable by offence, and period. Hence, the findings support an age structure-crime pattern, one which may to some extent be shaped by differences in age-crime trends.

In sum, the findings presented in this chapter are suggesting that the age-crime pattern is both variant and invariant, and that structural ageing is influencing age-crime trends. However, there are some differences across the two states in, for example, the distribution of apprehensions and the strength of correlations. These differences may be related to differences in the age compositions of the two general populations.

Specific conclusions regarding these associations cannot be drawn from the exploratory analyses discussed so far; hence, there is a need to explore the two expressions of the age structure-crime pattern that emerge from the Easterlin

hypothesis (1987a), being the cohort density and age composition expressions, in greater detail. Thus, this thesis now shifts its focus to the specific expressions of the age structure-crime pattern, commencing with an aggregate analysis of the cohort density expression in relation to Western Australian apprehensions, 1994-2002, in Chapter 8.

Chapter Eight – Age and Cohort Effects for Western Australia, 1994-2002: Total Apprehensions

The cohort density expression of the age structure-crime pattern is investigated in this chapter, for male and female birth cohorts, in relation to aggregate Western Australian age-specific apprehension levels, for the period 1994-2002. The analytical technique employed for this aspect of the analysis is cohort analysis, and it utilises apprehension data from *Crime and Justice Statistics for Western Australia* (CRC 1995-2003), and population data from *Population by Age and Sex, Australian States and Territories* (ABS 2005a) (see Chapters 5 and 6).

The analysis will refer to three effects: age, period and cohort. Here, age effects refer to whether apprehension ratios decline with each successive older age group. Departures from this trend, which indicate a participation in criminal activity beyond that suggested by the (conceptual) age-crime pattern, may occur in one of three ways: significant, substantial, or minor (as outlined in Chapter 6). These three levels of departure refer, respectively, to acceleration, no change, and deceleration in the rate of change between ages. Where one of these departures is evident, a period and/or cohort effect is suggested. Period effects refer to the historical period that a birth cohort is living through at a particular age. The primary period effect considered here is unemployment. Cohort effects refer to how one birth cohort compares to another birth cohort, both when they were at the same age, and cumulatively across their respective life cycles. A birth cohort develops and accumulates its cohort effects via the interaction of age and period (shown in the age-period-cohort nexus in Chapter 3).

The analysis is conducted in two stages: cross-sectional and longitudinal. The cross-sectional analysis illustrates changes in the apprehension levels of age groups over time. The longitudinal analysis involves the construction of a Lexis Diagram (which, as discussed in Chapter 5 and Appendix B, reorganises the cross-sectional data

longitudinally), for the purpose of tracing relative change in the cohort-specific apprehension trends across their relative life course. Although this approach treats birth cohorts as if they are 'closed' (for example, lose or gain no members), there is no intention to imply that they contain the self-same members as they age. Rather, the analysis merely shows the extent to which each birth cohort has experienced rising or falling apprehension ratios as it has aged, irrespective of which individuals were actually apprehended.

8.1 Male Apprehension Trends

This section examines cohort effects for the male population of Western Australia, across the period 1994-2002, in relation to total apprehensions. Males were apprehended 6,721, 6,442 and 7,130 times in 1994, 1998 and 2004 respectively.

8.1.1 Cross Sectional Analysis

Figure 8.1.1.1 shows that between 1994 and 2002, in Western Australia, the percentage of males being apprehended is lower for each successively older age group. Apprehensions were most common at age 18-21 years (a ratio of 3.13 apprehensions per 100 males of this age in 2002), and least common at age 42-45 years (a ratio of 0.55 in 2002). This picture reflects the (conceptual) age-crime pattern.

Despite this trend, some fluctuation in age-specific apprehension ratios is evident across the period. In particular, by 2002, apprehension ratios for 18-21 year olds had fallen to almost three-quarters of their 1994 level, while those for 30-33 year olds had increased by almost one-third. Ratios for all but 22-25 and 42-45 year olds similarly fluctuated between 1994 and 2002, generally decreasing, then increasing.

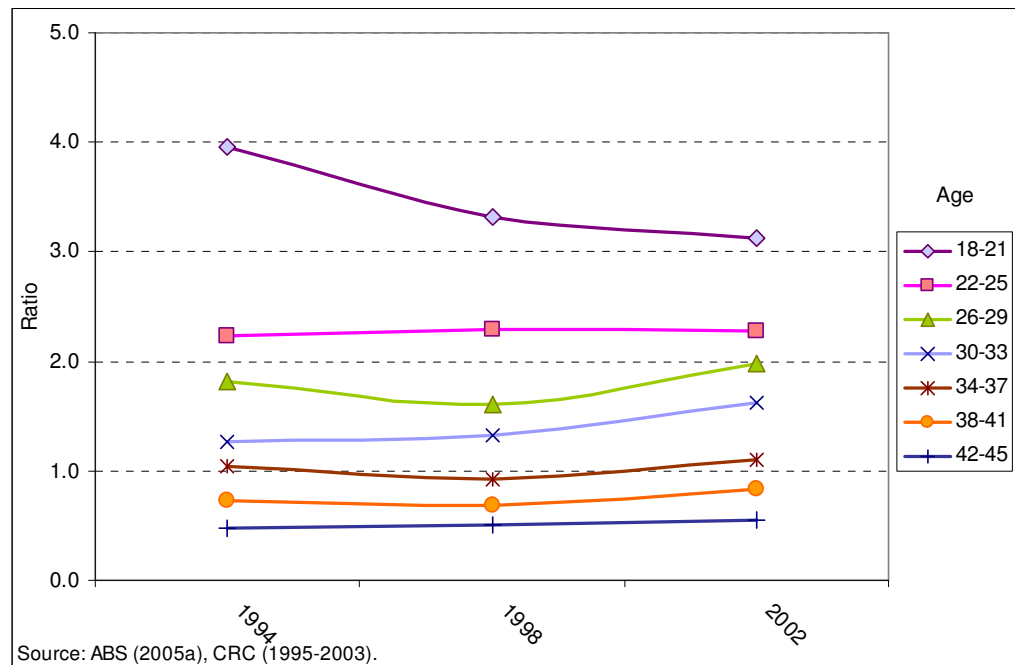


Figure 8.1.1.1: Male Western Australian Apprehensions: Ratio at Each Age ('00), 1994-2002.

8.1.2 Longitudinal Analysis

The age-specific apprehension ratios from the previous section are now reorganised for birth cohorts in order to trace the relative experience of each cohort over time. Five 'complete' cohorts (for which we have data for three observations) can be considered here, being those born 1957-60, 1961-64, 1965-68, 1969-72, and 1973-76, along with two 'partial' cohorts (born 1953-56 and 1977-80) for which we have data for two observations.

The apprehension ratios of the five complete cohorts as they have aged again provide strong evidence for the age-crime pattern (Table 8.1.2.1, also Figure 8.1.2.1). Younger birth cohorts all experienced higher apprehension ratios than older birth cohorts, and all – with the minor exception of the cohort born 1969-72 – show declining apprehension ratios as they have aged. This trend is similarly indicative of the (conceptual) age-crime pattern.

Nonetheless, apprehension trends for each cohort indicate a deceleration in the rate of decline as the cohort has aged. It is possible that this trend relates to a slowing in the progression of desistance that often occurs as the individual ages (referred to in

Chapters 1 and 2). However, the changes also vary across cohorts, as Figure 8.1.2.1 shows. For example, between ages 26-29 and 30-33 years, the cohort born 1969-72 experienced essentially no change in apprehension ratios, while the cohort born 1965-68 experienced a decline. In this respect, the trend for cohorts to experience a deceleration in the ‘ageing out’ of crime cannot simply be dismissed as an age effect. Rather, the decelerations appear to be indicating departures from the age-crime pattern (and thus some variance in the age-crime pattern, and more so than shown by cross-sectional analysis alone), which may be indicative of period and/or cohort effects.

Table 8.1.2.1: Male Western Australian Age-Specific Apprehension Ratios: By Cohort ('00), 1994, 1998 and 2002.

Age/Year Born	1994	1998	2002
14-17 (Born 1977-80)	No Data		
18-21 (Born 1973-76)	3.96	3.32	
22-25 (Born 1969-72)	2.23	2.29	2.28
26-29 (Born 1965-68)	1.82	1.61	1.98
30-33 (Born 1961-64)	1.26	1.32	1.62
34-37 (Born 1957-60)	1.04	0.92	1.11
38-41 (Born 1953-56)	0.74	0.68	0.83
		0.50	0.55

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Specifically, a substantial departure from the age-crime pattern is indicated for the cohort born 1969-72 (as evidenced by an increase in its ratio of only one per cent between ages 26-29 and 30-33 years). In contrast, minor departures (as evidenced by a reduction in the rate of decline of at least one-quarter) are indicated for the cohorts born 1957-60, 1961-64, 1965-68, and 1973-76. As all are indicated over the same period (that corresponding to 1998-2002), the findings also support the argument of a period effect influencing male apprehension trends. However, as there is (some) variability in the level of departure across birth cohorts (i.e. minor or substantial), it

cannot be assumed that this has been a *common* period effect (such as a change in policing procedures).¹ Rather, it may indicate cohort effects.

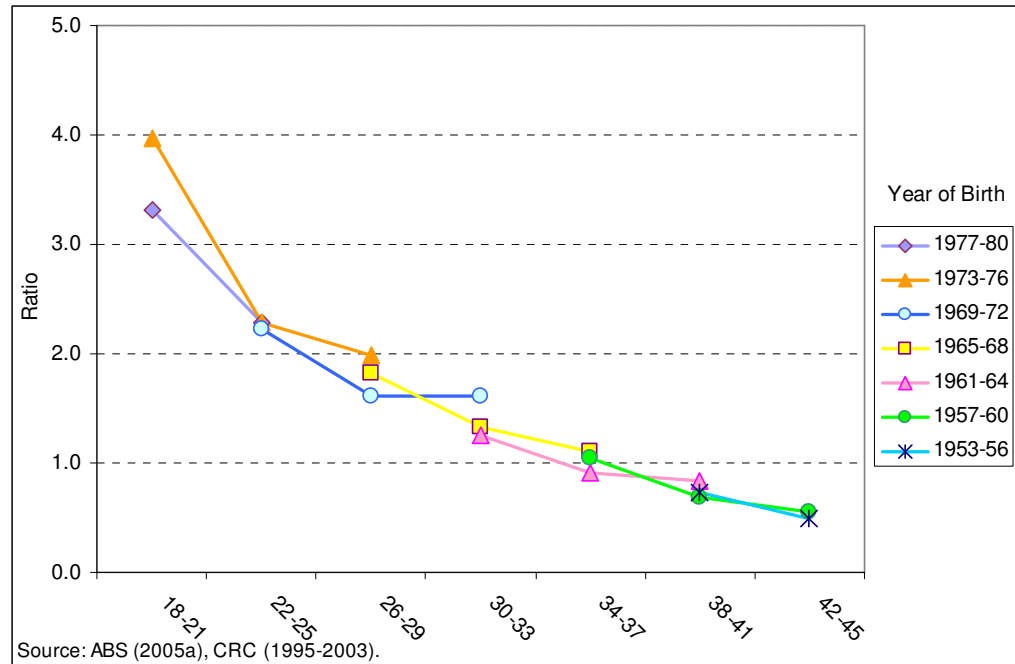


Figure 8.1.2.1: Male Western Australian Apprehensions: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

The substantial departure from the age-crime pattern that is indicated for the cohort born 1969-72 (which, in contrast to its immediately older predecessor born 1965-68, experienced negligible change in apprehension ratios between ages 26-29 and 30-33 years) may, in particular, be related to a cohort effect. With reference to the theoretical background being drawn on here in relation to cohort analysis, and as discussed in Chapters 1, 3, and 6, birth cohort size peaked in Australia for the cohort born 1971. Indeed, the mean number of persons in the male Western Australian cohort born 1969-72 at age 18 years was 13,681 compared to 10,925, 11,830, 11,925, and 13,064 for the respective cohorts born 1957-60, 1961-64, 1965-68, and 1973-76 at the same age (see Figure B.4.1 in Appendix B).

¹ I acknowledge that changes in policing are not applied uniformly across all age groups. For example, it is well established that they tend to focus on juveniles and younger age groups. Similarly, changes in reporting may also affect one age group rather than (or more then) another. However, the type of analysis here – i.e. one that focuses on cohorts rather than age groups per se – does not readily lend itself to such interpretations.

In comparison to other birth cohorts, the cohort born 1969-72 faced a high level of internal competition (i.e. relative disadvantage). The proxy variable for examining the impact of relative disadvantage in this investigation relates to birth cohorts' early experiences of unemployment (as discussed in Chapters 4 and 6). Labour market entry age for the cohort born 1969-72 coincided with a period of very high unemployment in Australia (this occurring in the late 1980s). When the cohort reached 16-19 years of age, across the period 1985 to 1991, unemployment rates (per 1,000) for Western Australian males of this age ranged between 18 and 22 per cent (falling from 18 per cent in 1985 to 13 per cent in 1989, then increasing to 22 per cent in 1991) (see Figures B.7.1 and B.7.2 in Appendix B). The cohort then reached 20-23 years of age over the period 1989 to 1996, and subsequently males experienced unemployment rates which rose (in Western Australia) from 7 to 20 per cent (peaking in 1991), then fell back to 11 per cent.

The combination of the large size of the birth cohort and the poor labour market it encountered (a period effect) would have resulted in the cohort experiencing high relative disadvantage, at least at that critical early-adult life stage. The Easterlin hypothesis (1987a) (outlined in Chapters 1 and 3) would suggest that the substantial departure from the age-crime pattern indicated for this birth cohort (the lack of change in apprehension ratios between ages 26-29 and 30-33 years) could be reflecting such disadvantage and associated stress levels. That is, increased competition for employment with its own members (intra-cohort competition) could have resulted in the cohort maintaining, rather than reducing, its offence levels (and thus its apprehension levels) as it has aged.

Similar comments would apply to the immediately later-born cohort (born 1973-76). Being the younger and smaller of the 'baby bust' cohorts, this lagging edge cohort was relatively large (as indicated in Chapters 1 and 3) and also struck disproportionately high unemployment rates when entering the labour market. The unemployment rates experienced by the male cohort born 1973-76 at age 16-19 years (across the period 1989-1995) in Western Australia ranged from 13 to 15 per cent (increasing from 13 per cent in 1989 to almost 25 per cent in 1992, and declining to 15 per cent in 1995); subsequently, at age 20-23 years (across the period 1993-1999),

the cohort's unemployment rate ranged from 10 to 14 per cent (peaking at 15 per cent in 1996) (Figures B.7.1 and B.7.3 in Appendix B).

However, from Figure 8.1.2.1, the cohort born 1973-76 does not show any significant signs of an extended participation in crime (having experienced only a minor deceleration in apprehensions ratios between ages 22-25 and 26-29 years). This indicates that high levels of cohort density (i.e. size and internal competition) may not have a homogenous impact on apprehension trends. In this instance, it is indeed only the leading edge cohort (born 1969-72) that has experienced a potential cohort effect. On the other hand, when the cohort born 1973-76 was aged 18-21 years in 1994, a particularly high apprehension ratio is indicated relative to its immediate successor (the cohort born 1977-80). This trend could, therefore, still be related to high cohort density and, in turn, add support for the cohort density expression (and hence, that high cohort density may be a source of variation for the age-crime pattern).

8.1.3 Summary

Apprehension trends for the male population of Western Australia, 1994-2002, have generally been consistent with the 'classic' age-crime pattern, with ratios being lower for each successively older age group. However, minor to substantial departures from the age-crime pattern suggest that period and/or cohort effects may also be present, which in turn indicates that the age-crime pattern is not rigidly invariant. Most importantly, the peak baby bust cohort born 1969-72 indicated a possible cohort effect that has extended their offending period beyond the young crime-prone ages. This finding provides support for the Easterlin hypothesis, and suggests that high cohort density is a source of variation for the age-crime pattern. On the other hand, a cohort effect was not clearly indicated for the immediately younger baby bust cohort born 1973-76; hence, the impact of high cohort density, may be variable.

8.2 Female Apprehension Trends

This section focuses on apprehension trends for female Western Australian birth cohorts, who together experienced 2,274, 2,658 and 3,224 apprehensions during 1994, 1998, and 2002 respectively.

8.2.1 Cross Sectional Analysis

Evidence of the (conceptual) age-crime pattern is less conclusive for the female population of Western Australia (see Figure 8.2.1.1). Of particular note, in 2002, 22-25 year olds were apprehended at a higher level than 18-21 year olds, while 42-45 year olds were apprehended at a higher level than 38-41 year olds across the analysis (although this particular finding may reflect the latter's low bases).

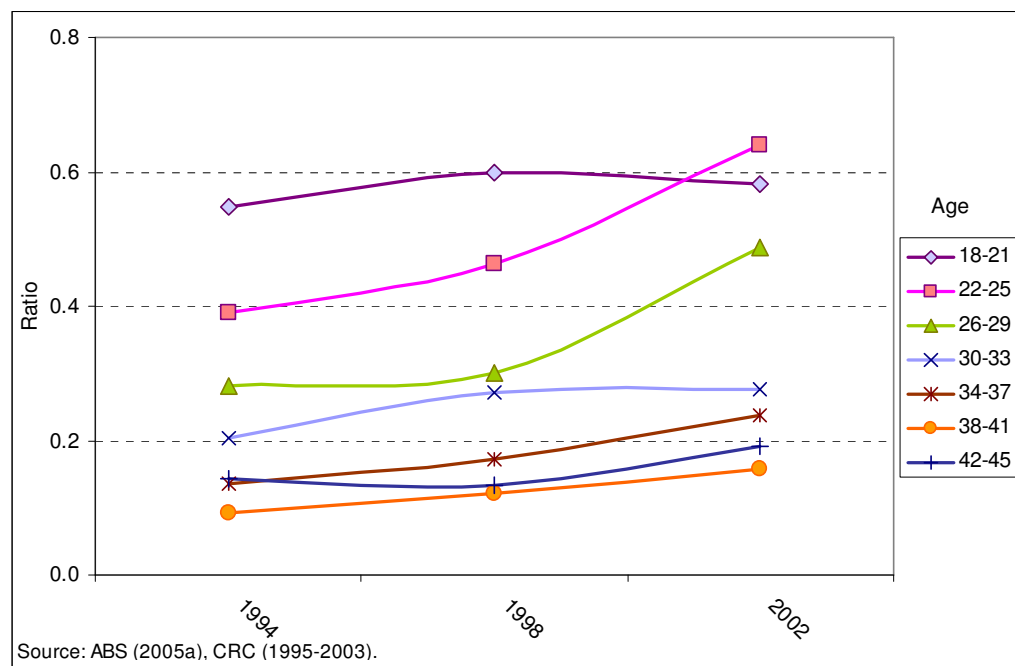


Figure 8.2.1.1: Female Western Australian Apprehensions: Ratio at Each Age ('00), 1994-2002.

Moreover, the ratios of apprehension to population numbers per 100 females have fluctuated at each age, but the level of change has varied. Overall, ratios increased by around one-half for 22-25, 26-29, 34-37 and 38-41 year olds, and by approximately one-third for 30-33 and 42-45 year olds. The majority of change occurred between 1998 and 2002.

8.2.2 Longitudinal Analysis

Reorganising the age-specific apprehension ratios from the previous section for the purpose of tracing the relative experiences of each female cohort over time provides some evidence for an age-crime pattern. At each age, younger cohorts exhibit higher apprehension ratios than older cohorts (with the exception that, in 2002, the apprehension ratio of the cohort born 1961-64 was lower than the apprehension ratio of the cohort born 1957-60) (Table 8.2.2.1; also Figure 8.2.2.1). However, while ratios for three cohorts decline as they age, those for four cohorts increase. These trends suggest that females have experienced a variant association between age and crime.

Table 8.2.2.1: Female Western Australian Age-Specific Apprehension Ratios ('00): By Cohort ('00), 1994, 1998 and 2002.

Age/Year Born	1994	1998	2002
14-17 (Born 1977-80)	No Data		
18-21 (Born 1973-76)	0.55	0.60	
22-25 (Born 1969-72)	0.39	0.46	0.64
26-29 (Born 1965-68)	0.28	0.30	0.49
30-33 (Born 1961-64)	0.20	0.27	0.28
34-37 (Born 1957-60)	0.14	0.17	0.24
38-41 (Born 1953-56)	0.09	0.12	0.16
		0.13	0.19

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

More specifically, each female birth cohort has experienced a departure from the age-crime pattern. Significant departures (as evidenced by a ratio increasing by more than five per cent) are indicated for the cohorts born 1953-56, 1957-60, 1973-76, and 1977-80, while minor departures (as evidenced by a reduction in the rate of decline of at least one-quarter) are indicated for the cohorts born 1961-64, 1965-68, and 1969-72 (and thus, female birth cohorts have deviated from the age-crime pattern more frequently, and at a higher level, than their male counterparts).

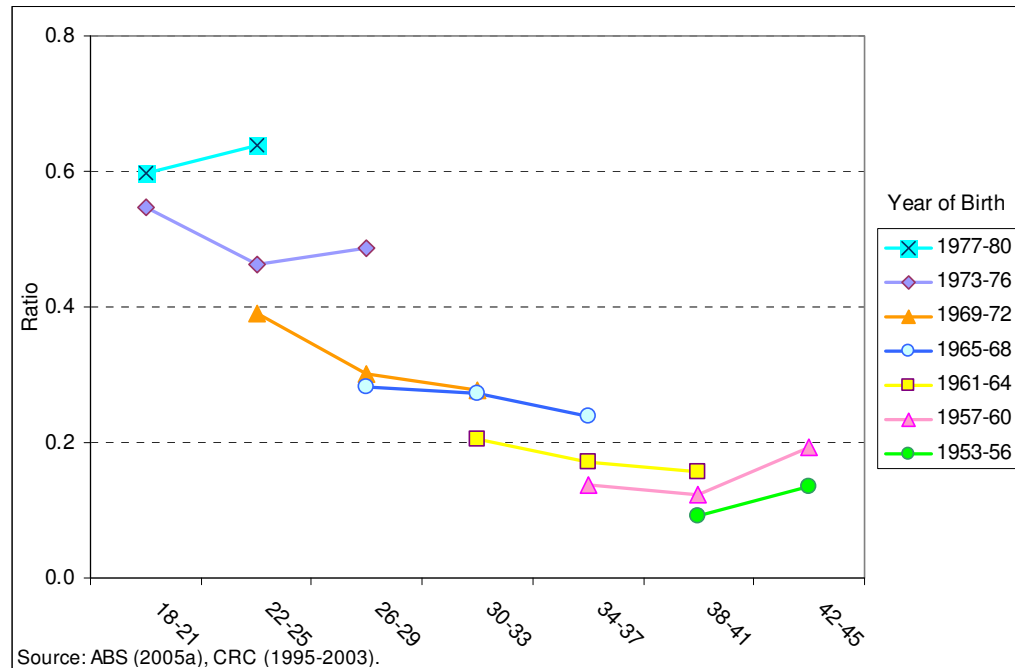


Figure 8.2.2.1: Female Western Australian Apprehensions: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

As discussed for males, female apprehension trends in Western Australia may have been influenced by period effects. In contrast to males, however, the above-noted departures from the age-crime pattern have not occurred over any particular period (the cohorts born 1953-56 and 1965-68 appear to have deviated from the age-crime pattern across the period corresponding to 1994-1998, and all other birth cohorts to 1998-2002). Further, departures over the same period are variable by cohort (for the 1994-1998 period, for example, a significant departure for the cohort born 1953-56, but only a substantial departure for the cohort born 1965-68, is indicated). The trends thus differ from cohort to cohort, and so we can reject the argument that they reflect a *common* period effect (for example, a change in policing or surveillance methods). Rather, they may be indicating cohort effects.

For the cohort born 1973-76 (which experienced an increase in its ratio of five per cent between ages 22-25 and 26-29 years corresponding to 1998 and 2002), its departure from the age-crime pattern may be related to its relatively high level of cohort density. As noted in the previous section, the cohort born 1973-76 was born in the latter period of the 'baby bust' (and is thus a lagging edge cohort). It is therefore

a very large cohort (a mean 12,347 members at age 18 years in Western Australia), albeit a little smaller than its predecessor, the peak-size cohort born 1969-72 (13,068 mean members) (see Figure B.4.2 in Appendix B). It was also larger than the cohorts born 1957-60, 1961-64, and 1965-68 (which each had fewer than 11,500 mean members at age 18 years).

Consequently, as outlined previously, the Easterlin hypothesis would hold that the cohort born 1973-76 faced a high level of both intra-cohort competition (with its other members) and inter-cohort competition (with its older predecessor, the leading edge cohort born 1969-72). From this perspective, the repercussions of the very high unemployment levels in Western Australia over their period of labour market entry (a period effect, outlined for males in the previous section) may have been similarly imposed on the 1973-76 cohort. The cohort born 1973-76 reached the age of 16-19 years across the period 1989 to 1995. Unemployment rates per 1,000 females aged 16-19 years in Western Australia across this period ranged from 12 to 16 per cent (increasing from 12 per cent in 1989 to 22 per cent in 1992, and declining to 16 per cent in 1995) (see Figures B.7.4 and B.7.6 in Appendix B). Subsequently, when the birth cohort reached 20-23 years of age between 1993 and 1999, unemployment levels at this age fell from 13 to nine per cent. It is possible that the departure from the age-crime pattern that is evident in the analysis for this birth cohort could be a lingering manifestation of this disadvantage. This would support the cohort density expression of the age structure-crime pattern, and also suggest that high cohort density is a source of variability for the age-crime pattern.

Similar comments would apply to the immediately earlier-born cohort (born 1969-72). As indicated previously, this is the largest birth cohort in Australia (and the analysis). Similarly, when the female cohort born 1969-72 was first entering the Western Australian labour market at age 16-19 years, it experienced unemployment rates ranging from 18 to 20 per cent (declining from 18 per cent in 1985 to 15 per cent in 1988, and increasing to 20 per cent in 1991). When this cohort was aged 20-23 years, between 1989 and 1995, unemployment rates ranged from nine to 10 per cent (but peaking at 15 per cent in 1992) (Figures B.7.4 and B.7.5 in Appendix B).

However, the cohort born 1969-72 does not show any significant signs of an extension in criminal activity beyond the young crime-prone ages (having experienced only a deceleration in the rate of change between ages 26-29 and 30-33 years). Thus, departures from the age-crime pattern differ across the two baby bust cohorts (recalling that the cohort born 1973-76 experienced acceleration in the rate of change as it aged). On this basis, the impact of high cohort density, appears to be variable (as for males), although in this instance it is the apprehension trends of the lagging edge cohort that have been impacted on at the higher level.

In contrast to findings for males, some of the smaller cohorts also indicate departures from the age-crime pattern. However, all cohorts born prior to, and including, the cohort born 1965-68 are smaller than the cohorts born 1969-72 and 1973-76. Hence, it appears that high cohort density is not related to the apprehension trends for these older cohorts, which means that high cohort density is not the exclusive (potential) cause of female apprehension trends running counter to the age-crime pattern.

8.2.3 Summary

The age-crime pattern was generally evident for the female population of Western Australia between 1994 and 2002, but younger age groups did not always experience higher apprehension ratios than older age groups. In particular, potential departures from the age-crime pattern were suggested for all cohorts, suggesting that the age-crime pattern is – as suggested by O'Brien and Stockard (2009) – not rigidly invariant. While a possible cohort effect was indicated for one of the high density cohorts (born 1973-76), there was no clear evidence of such for the other (born 1969-72). Hence, while there is support for the cohort density expression (suggesting that high cohort density is a potential source of variance for the age-crime pattern), the influence of cohort density is variable. In addition, the departures from the age-crime pattern experienced by smaller cohorts indicate that cohort density cannot be the only intervening variable shaping female apprehension trends.

8.3 Summary and Conclusions

The following trends emerge across analyses for aggregate male and female apprehension trends in Western Australia between 1994 and 2002:

1. Apprehension ratios are generally lower for each successively older age group (a little more for males than females).
2. However, numerous departures from this 'classic' age-crime pattern appear across cohorts (particularly for females). Inspecting change in the level of age-specific apprehensions over time, as well as change from one age to the next across cohorts, suggests that these departures may have arisen from period effects rather than age effects alone (particularly for males).
3. Any period effects cannot be regarded as common period effects, due to variability in trends across cohorts. Instead, they are more likely to be cohort effects.
4. The possibility of cohort effects were evident for one of the cohorts that experienced high levels of cohort density (i.e. size and internal competition), being those born 1969-72 and 1973-76, for both sexes. While the (leading edge) cohort born 1969-72 suggested a substantial departure from the age-crime pattern for only males, clear evidence of an extension in criminal activity beyond the young crime-prone ages for the (lagging edge) cohort born 1973-76 was shown for only females.

Overall, therefore, it appears that:

1. The age-crime pattern in its classic formation is primarily invariant.
2. When viewed by cohort, the association between age and crime appears to be more variant. In particular, despite some differences with regard to the level of departure from the age-crime pattern across the large baby bust cohorts born 1969-72 and 1973-76 (which suggest that high cohort density may have had a slightly greater impact on apprehension trends for females rather than males), their respective apprehension trends generally indicate cohort effects resulting in an extension in participation in criminal activity. The cohort density expression of the age structure-crime pattern (or the classic

expression of the Easterlin hypothesis) is thus largely supported and, hence, cohort density is a likely source of variance for the age-crime pattern.

3. However, because apprehension trends for *some* smaller (especially female) birth cohorts – which have experienced lower levels of cohort density – also indicate potential departures from the age-crime pattern, the cohort density expression could be regarded as plausible.

The following chapter continues the investigation of cohort effects for the male and female population of Western Australia, for the period 1994-2002, by turning from total apprehension ratios to offence-specific apprehension ratios.

Chapter Nine – Cohort Effects for Western Australia, 1994-2002: By Offence Category

Expanding on Chapter 8, this chapter continues the examination of the cohort density expression of the age structure-crime pattern with regard to Western Australian cohort-specific apprehensions, by offence category, for the period 1994-2002. The five offence categories examined are: offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion. The analytical technique and data sources are the same as those applied in Chapter 8.

9.1 Offences Against Property

This section examines offences against property, which were seen in Chapter 7 to account for approximately one-third of all apprehensions in Western Australia between 1994 and 2002, being the second largest of the five offence categories considered in the cohort analysis.

9.1.1 Male Apprehension Trends

From Figure 9.1.1.1, age-specific apprehension ratios per 100 males for offences against property are lower, and generally decline, for each successively older cohort, providing evidence for the (conceptual) age-crime pattern. However, some departures from the pattern are evident. These departures are significant for the cohort born 1969-72, but substantial for the cohorts born 1957-60, 1961-64 and 1965-68, and minor for the cohort born 1973-76. These findings are all indicated for the period corresponding to 1998-2002, but the variability in the level of departure across cohorts means that any period effect has not been a common period effect (such as a change in policing strategies or reporting levels that would have affected all cohorts).

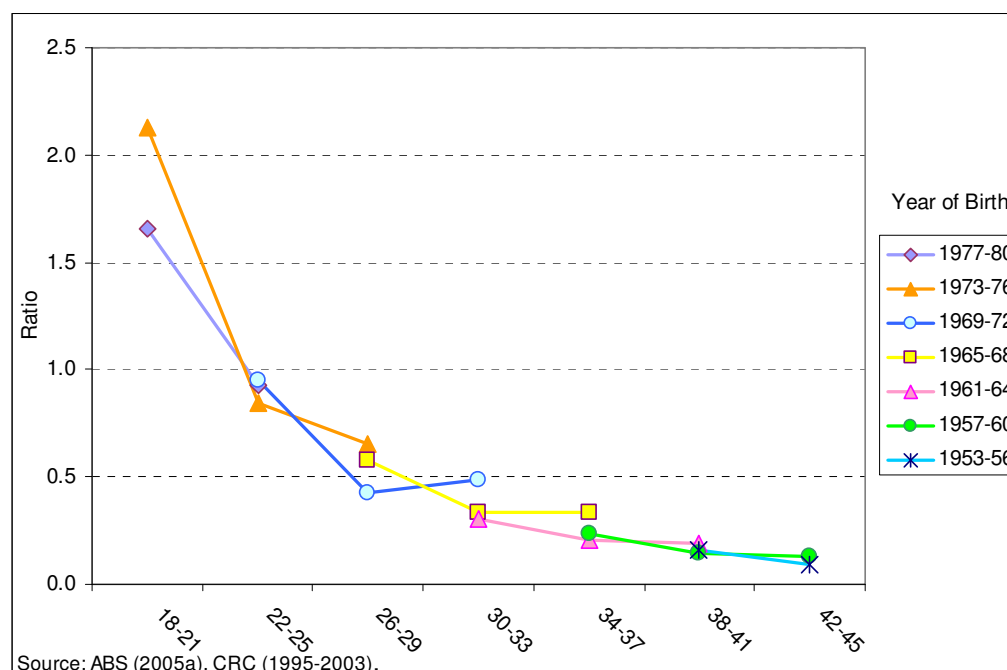


Figure 9.1.1.1: Male Western Australian Apprehensions, Offences Against Property: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

The significant departure for the cohort born 1969-72 (an increase in ratios of 16 per cent between age 26-29 and 30-33 years), for example, may be related to its relatively large size and disadvantageous conditions occurring in the labour market as it reached labour market entry age (explained in Chapter 8). That is, the finding for the cohort born 1969-72 is suggestive of the possible lingering effects of that encounter, causing the cohort to extend – as opposed to leaving behind – its participation in criminal activity. This is reflective of Easterlin's (1987a) arguments concerning cohort density (i.e. size and internal competition), and suggests that high cohort density has been a source of variance to the age-crime pattern as it relates to male apprehension trends for offences against property.

On the other hand, the cohort born 1973-76 – a lagging edge cohort that was also large in size and entered the labour market at a time of high unemployment rates (as discussed in Chapter 8) – appears to have experienced only a minor departure from the age-crime pattern. That is, there is a deceleration in the rate of decline between ages 22-25 and 26-29 years. Thus, the cohort born 1973-76 does not present evidence of continuing with criminal activity past the young-crime ages to any great degree, as

does the cohort born 1969-72, and so the impact of high cohort density (if that is the cause) is variable.

Indeed, the cohorts born 1957-60, 1961-64, and 1965-68 – which have each experienced lower levels of cohort density than the ‘baby bust’ cohorts (as discussed in the previous chapter in relation to female apprehension trends) – have digressed from the age-crime pattern at a higher level than the cohort born 1973-76. These findings detract a little from support for the cohort density expression, and illustrate that digressions from the age-crime pattern are not caused solely by high cohort density.

9.1.2 Female Apprehension Trends

Age-specific apprehension trends for females in relation to offences against property similarly reflect the age-crime pattern, as ratios (per 100 females) have generally been higher for younger cohorts than older cohorts (Figure 9.1.2.1). A consistent rate of decline, however, is indicated for only two cohorts (born 1961-64 and 1965-68). Rather, significant departures are indicated for the cohorts born 1957-60, 1969-72 and 1973-76 (although this finding for the former may be a reflection of its low base). Therefore, only some cohort-specific apprehension trends run counter to the age-crime pattern, so it is more likely that the above-noted departures reflect a cohort effect resulting in an extended period of participation in criminal activity as opposed to a common period effect.

Findings for the cohorts born 1969-72 and 1973-76 (relating to respective increases in ratios of 23 per cent between ages 26-29 and 30-33 years, and 11 per cent between ages 22-25 and 26-29 years), may, as discussed in Chapter 8, be related to their relatively distended size and to intra- and inter-cohort competition in the labour market. That is, stress associated with these lifetime experiences may, for both birth cohorts, have translated into a heightened involvement with this offence category as the birth cohorts aged.

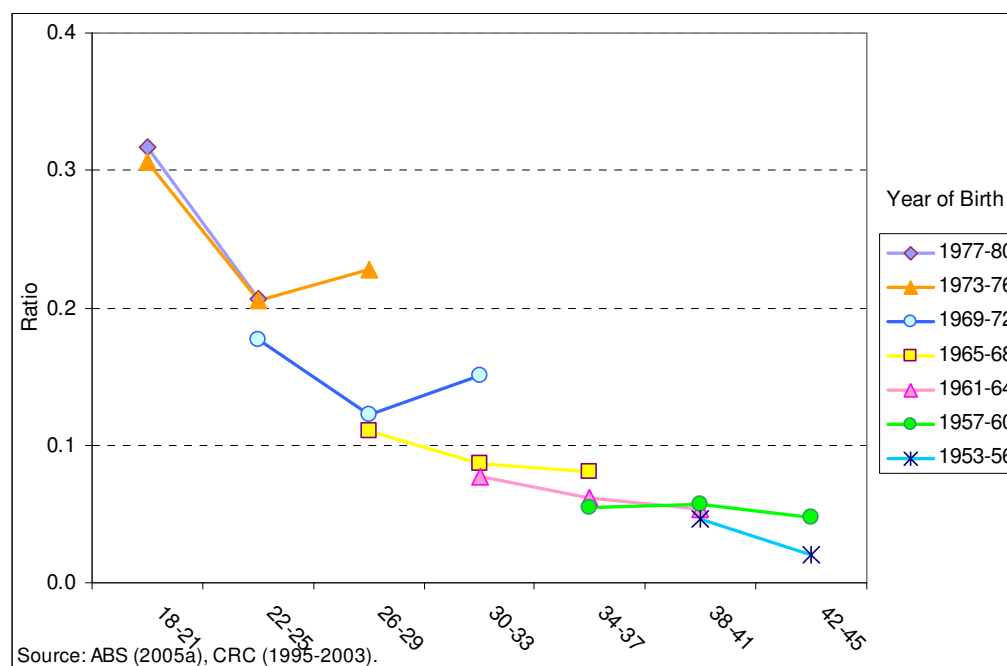


Figure 9.1.2.1: Female Western Australian Apprehensions, Offences Against Property: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

In this respect, Easterlin's expectations concerning the association between birth cohort size (and their associated life experiences) and crime are strongly supported by female apprehensions for offences against property (and more so than for equivalent male cohorts). Similarly, the findings (again) demonstrate that high cohort density is a potential cause of variance in an otherwise invariant age-crime pattern. In other words, Figure 9.1.2.1 reflects anticipated age effects (apprehension ratios declining with age), and, in the absence of any common period effects, the only (clear) variation in the age-crime pattern emerging from this aspect of the analysis reflects cohorts effects for the baby bust cohorts (and hence, high levels of cohort density).

9.2 Offences Against the Person

This section focuses on apprehension trends for offences against the person, being the offence category that Western Australians were most commonly apprehended for between 1994 and 2002 (almost half of all apprehensions in 1998) (see Chapter 7).

9.2.1 Male Apprehension Trends

Male apprehension ratios for offences against the person are lower for each successively older cohort between 1994 and 2002 (Figure 9.2.1.1). Each cohort has also reduced its ratio as it aged. However, while no birth cohort has experienced an increase in their ratios as they have aged, only one (born 1965-68) demonstrates a *consistent* rate of decline.

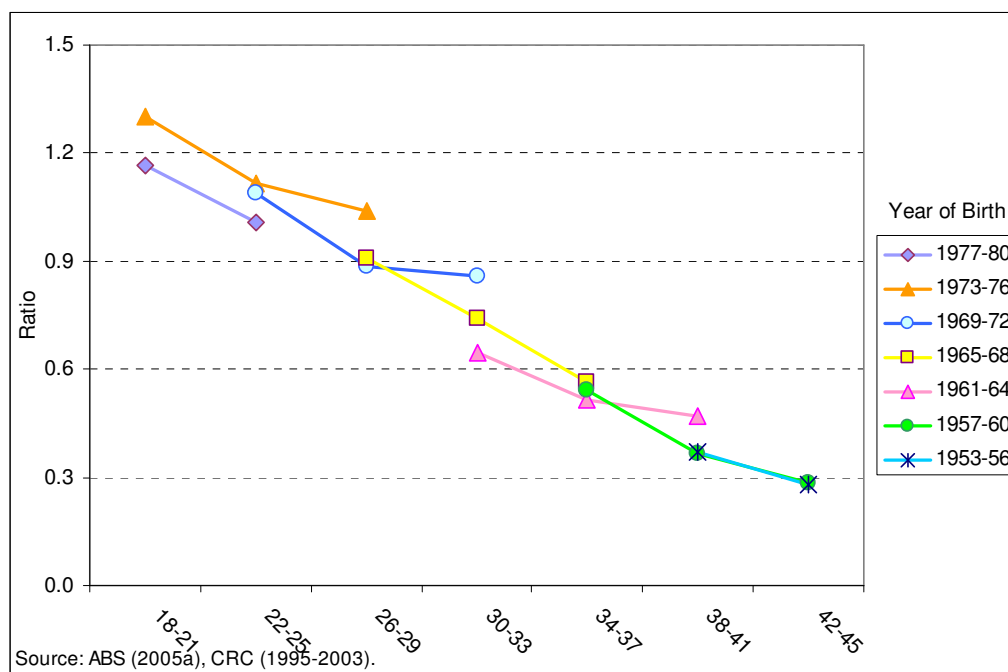


Figure 9.2.1.1: Male Western Australian Apprehensions, Offences Against the Person: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

Departures from the age-crime pattern have been substantial for the cohort born 1969-72, but minor for the cohorts born 1957-60, 1961-64, and 1973-76. All such departures occurred across the period corresponding to 1998-2002, but the variance in the extent of departure across cohorts suggests that the relative stability in ratios for the large cohort born 1969-72 (which declined by around three per cent between ages 26-29 and 30-33 years) may be associated with a cohort effect. Thus, while not conclusive, there is some support for the cohort density expression of the age structure-crime pattern (being stronger for the leading edge cohort than the lagging edge cohort) and, accordingly, high cohort density being a potential source of variance for the age-crime pattern.

9.2.2 Female Apprehension Trends

For the same offence category, female apprehension ratios are also generally lower for each successively older cohort (Figure 9.2.2.1). Conversely, there is no evidence of cohorts experiencing a consistent decline (in ratios) as it has aged; indeed, apprehension trends for each cohort are showing a departure from the age-crime pattern (and more so than for the equivalent male cohorts).

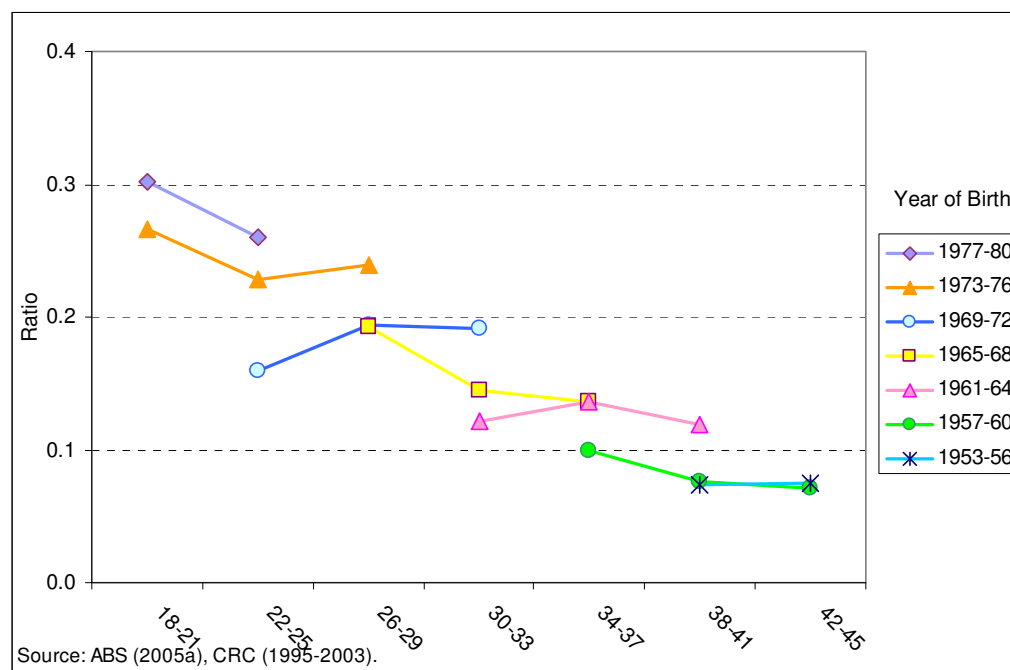


Figure 9.2.2.1: Female Western Australian Apprehensions, Offences Against the Person: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

For the cohorts born 1953-56, 1961-64, 1969-72 and 1973-76 this departure has been significant, while for the cohorts born 1957-60 and 1965-68 it has been minor. As the cohorts have not deviated from the age-crime pattern across any particular period (i.e. departures are indicated across the periods corresponding to both 1994-1998 and 1998-2002), nor at the same level, it would seem unlikely that the apprehension trends have been influenced by a common period effect. Rather, it would appear that several cohorts have experienced cohort effects, subsequently offending (or being apprehended) at a higher than anticipated level.

The significant departures for the cohorts born 1969-72 and 1973-76 (relating to ratios increasing by 21 and five per cent, respectively, between ages 22-25 and 26-29 years), may, as previously discussed, be associated with high cohort density. However, departures for the smaller cohorts (which are more frequent than those for the equivalent male cohorts) suggest that high cohort density has not been the only factor influencing female apprehension trends for these offences.

9.3 Fraud and Misappropriation

Apprehension trends relating to fraud and misappropriation are examined in this section. Despite this offence category being the third largest in the analysis (as shown in Chapter 7), fraud and misappropriation offences accounted for only one-tenth of all apprehensions in Western Australia between 1994 and 2002. Cell sizes are thus quite small and could affect results.

9.3.1 Male Apprehension Trends

Offence-specific apprehension ratios have (again) generally been higher for younger male cohorts than older male cohorts, yet a range of departures from the age-crime pattern are also evident (Figure 9.3.1.1). In fact, not one cohort has experienced a consistent rate of decline as it has aged.

Across the period corresponding to 1998 and 2002, the cohort born 1973-76 indicates a significant departure, while the cohort born 1969-72 indicates a substantial departure, and the cohorts born 1957-60, 1961-64, and 1965-68 minor departures. Thus, departures from the age-crime pattern for this offence category have differed across cohorts, meaning that they are unlikely to reflect a common period effect (such as new technologies increasing opportunities for offending). Instead, they may be indicating cohort effects.

For the cohorts born 1969-72 and 1973-76 (which experienced, respectively, no change in ratios between ages 26-29 and 30-33 years, and a seven per cent increase between ages 22-25 and 26-29 years), these effects may be related to high cohort

density. So may the very high ratios for these cohorts at the respective ages of 22-25 and 18-21 years. Thus, high cohort density appears to have caused the lagging edge cohort to deviate from the age-crime pattern at a higher level than the leading edge cohort. Furthermore, as extended periods of criminal activity are also indicated for cohorts that have experienced lower levels of cohort density than the baby bust cohorts, high cohort density cannot be regarded as the only factor to have influenced these offences.

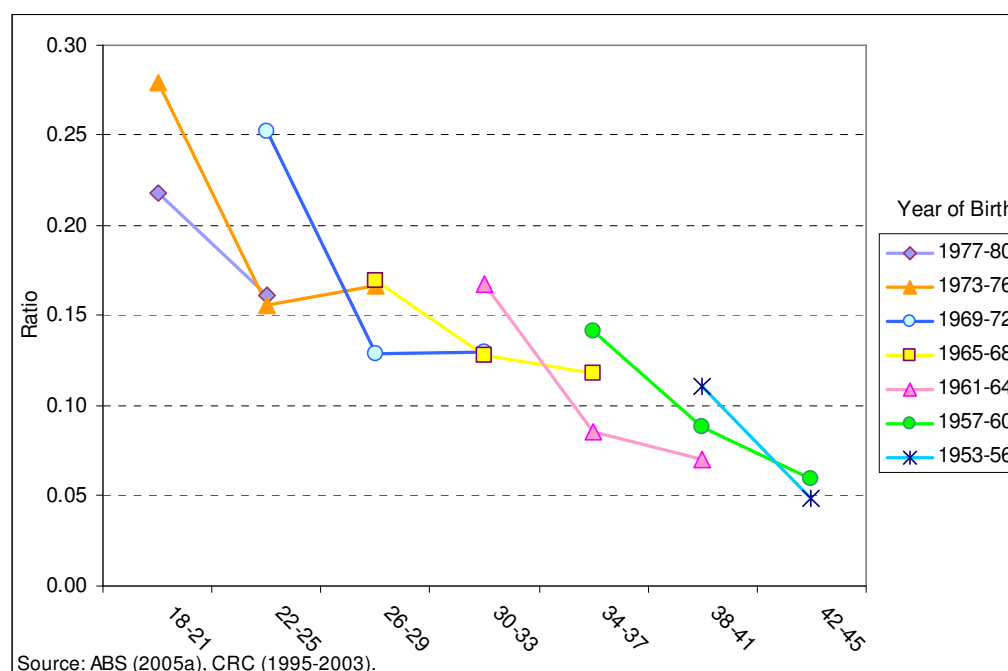


Figure 9.3.1.1: Male Western Australian Apprehensions, Fraud and Misappropriation: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

9.3.2 Female Apprehension Trends

The apprehension trends of Western Australian females for fraud and misappropriation are more representative of the age-crime pattern (Figure 9.3.2.1). Specifically, two cohorts (born 1957-60 and 1965-68) have experienced consistent decline (in ratios) as they have aged. However, significant departures are suggested for the cohorts born 1953-56 and 1973-76, compared to a substantial departure for the cohort born 1961-64, and a minor departure for the cohort born 1969-72. As these effects do not correspond with any particular period, and differ across cohort,

they appear to be indicating cohort effects. The finding for the cohort born 1953-56, however, could be a reflection of its very low base.

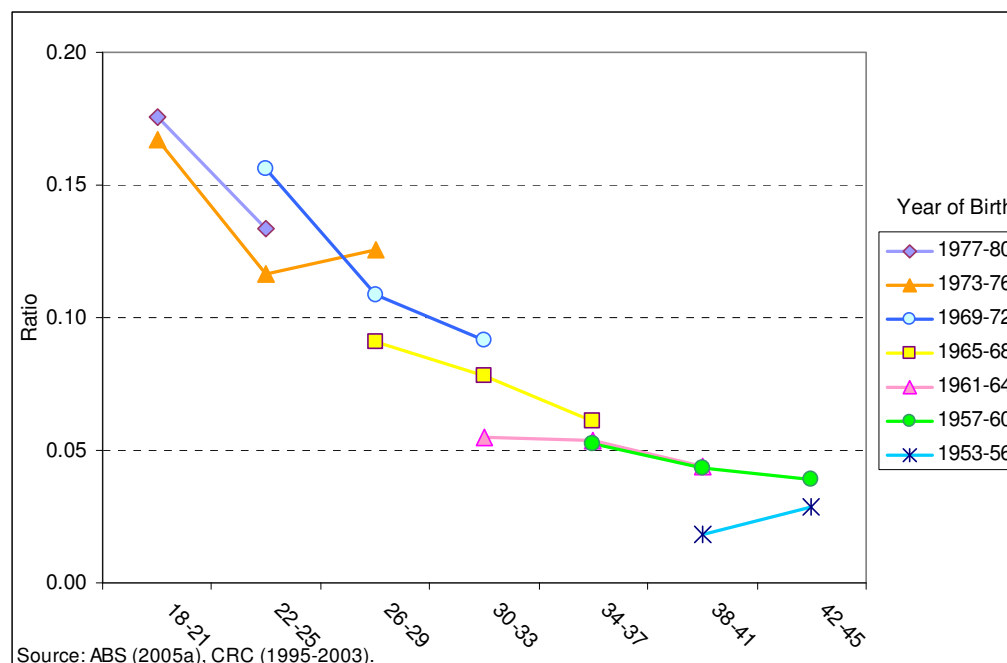


Figure 9.3.2.1: Female Western Australian Apprehensions, Fraud and Misappropriation: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

Hence, the digression for the cohort born 1973-76 (which increased its ratio by eight per cent between ages 22-25 and 26-29 years) – and possibly also the very high apprehension ratio for the cohort born 1969-72 when at 22-25 years of age – provide further support for the cohort density expression (although again, high cohort density does not appear to have a homogenous influence, being stronger for the lagging edge cohort). However, support for this expression of the age structure-crime pattern (again) is not straightforward, as some smaller cohorts – and thus cohorts experiencing lower levels of cohort density – also indicate having extended their involvement in criminal activity above the young crime-prone ages.

9.4 Sexual Offences

This section examines apprehensions for sexual offences, which accounted for a very low proportion of all apprehensions (around one-twentieth) in Western Australia,

1994-2002, and is the fourth largest of the five offence categories (see Chapter 7). Data are presented for males only, as females did not attract a sufficient level of apprehensions over this period to conduct a reliable analysis.

9.4.1 Male Apprehension Trends

Figure 9.4.1.1 shows that male apprehension ratios for this offence category were generally *not* lower with each successively older cohort. While ratios for two cohorts (those born 1961-64 and 1965-68) indicate consistent decline as they aged, those for three cohorts suggest departures from the age-crime pattern.

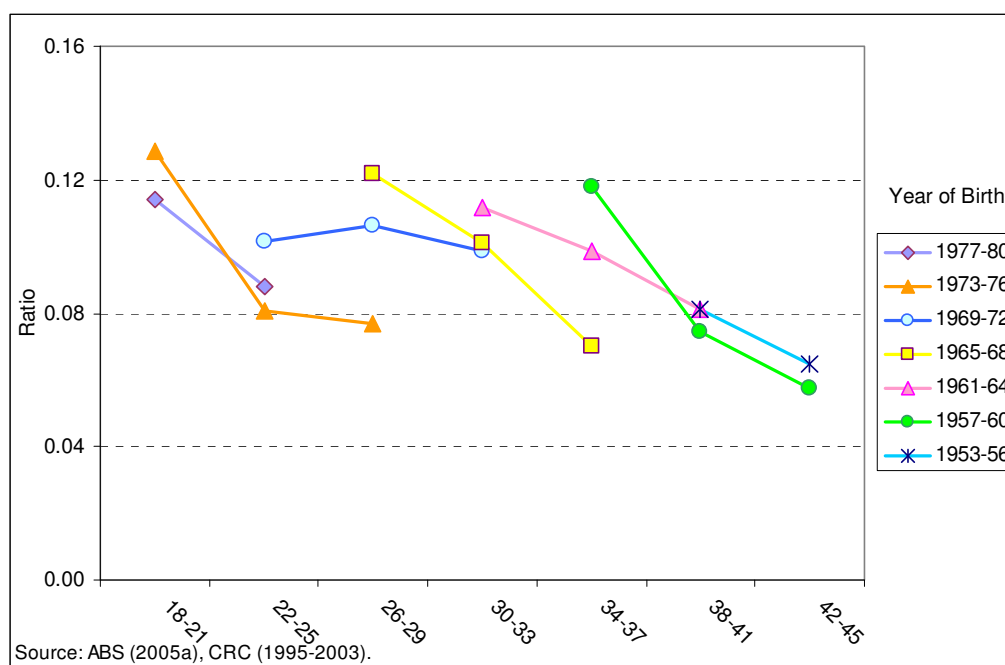


Figure 9.4.1.1: Male Western Australian Apprehensions, Sexual Offences: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

In this respect, male apprehension trends for sexual offences provide strong evidence for the cohort density expression, as it appears – for the first time across the disaggregate analyses – that an extension in criminal activity beyond the young crime-prone ages has been experienced only by cohorts reflecting high cohort density. Conversely, it is highly likely that the fluctuations reflect small cell sizes. If higher cohort density has been a causal factor, however, its impact (again) appears to be variable. This is because the (leading edge) cohort born 1969-72 shows a

significant departure (ratios increasing by five per cent between ages 22-25 and 26-29 years), while a substantial departure is shown for the (lagging edge) cohort born 1973-76 (ratios declining by four per cent between ages 22-25 and 26-29 years).

9.5 Robbery and Extortion

Apprehension trends for robbery and extortion are the subject of this section. Chapter 7 indicated that this offence category accounted for the lowest level of Western Australian apprehensions (around one-twentieth) between 1994 and 2002. Due to the very low base of female apprehensions for this particular offence, they are (again) excluded from the analysis.

9.5.1 Male Apprehension Trends

The (conceptual) age-crime pattern is more evident in relation to male apprehension trends for robbery and extortion (see Figure 9.5.1.1). Ratios are generally higher for younger cohorts than older cohorts. However, only two cohorts experienced consistent decline (in their ratios) as they aged.

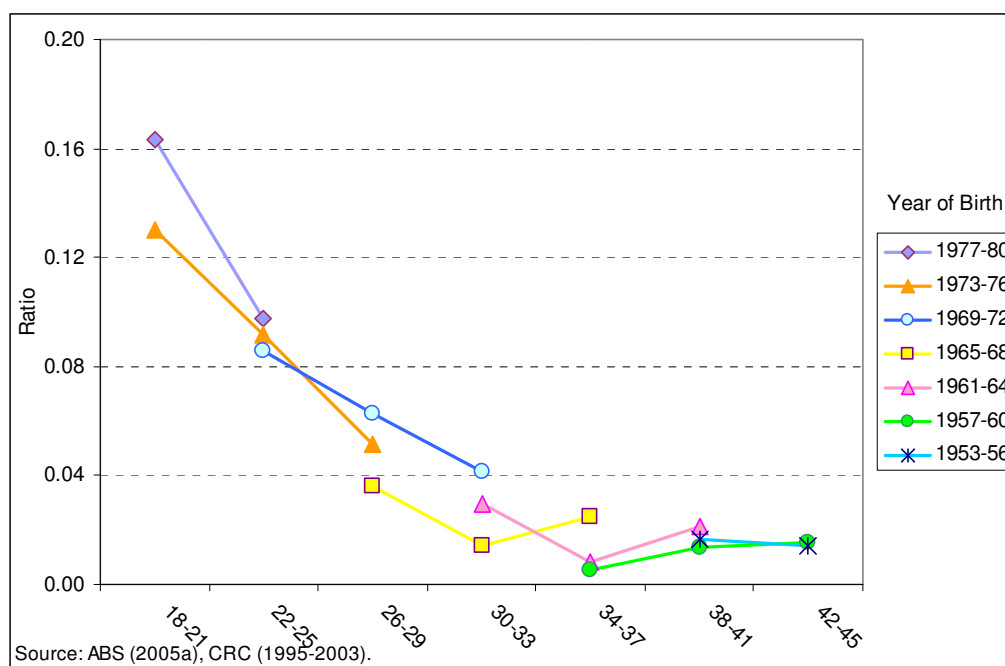


Figure 9.5.1.1: Male Western Australian Apprehensions, Robbery and Extortion: Ratio at Each Age ('00), by Birth Cohort, 1994-2002.

Ironically, contradicting the cohort density expression, these cohorts are those large pivotal cohorts born 1969-72 and 1973-76. By comparison, significant departures are indicated for the smaller cohorts (born 1957-60, 1961-64, and 1965-68) (which experienced increases in apprehension ratios of at least 70 per cent). On the other hand, the magnitude of changes for all cohorts may reflect the small base from which they are calculated (or be a reflection of rising levels of drug use).

9.6 Summary and Conclusions

The three conclusions drawn from the aggregate cohort analysis in Chapter 8 are further supported by the disaggregate analysis of Western Australian apprehensions, by offence category. That is:

1. The age-crime pattern is generally invariant.
2. The cohort density expression of the age structure-crime pattern (or the classic expression of the Easterlin hypothesis) is again evident, as is a variable impact in high cohort density across the large baby bust cohorts (born 1969-72 and 1973-76), and for males and females. Accordingly, high cohort density appears to be a potential source of variance in the age-crime pattern.
3. The cohort density expression may only be plausible, however, as some smaller cohorts (who have experienced lower levels of cohort density) also appear to have experienced extensions in their participation in crime beyond that anticipated by the (conceptual) association between age and crime pattern.

In addition to these general points, departures from the age-crime pattern were indicated for each offence category, particularly for those cohorts experiencing high cohort density. However, the extent of the departure (i.e. significant, substantial, or minor) varied across (and within) offence categories with regard to male and female cohort apprehension trends:

1. With regard to apprehension trends for the pivotal baby bust cohorts, departures from the age-crime pattern in relation to offences against property and also offences against the person were more sizeable for females. In relation to fraud and misappropriation, however, males show more sizeable departures from the pattern. Hence, female baby bust cohorts have been more likely to extend their participation in offences with a 'young' age distribution of offender, while the equivalent male cohorts have extended their participation in offences with an 'older' age distribution of offenders.
2. With regard to apprehension trends for the smaller birth cohorts, departures from the age-crime pattern in relation to offences against property are the most sizeable for males. In contrast, in relation to offences against the person, females show more sizeable departures from the pattern, while in relation to fraud and misappropriation, negligible difference in the experiences of males and females were suggested.
3. In relation to offences categories for which only male cohorts were examined (sexual offences, and robbery and extortion), the former indicated departures from the age-crime pattern for only the baby bust cohorts. In comparison, the latter showed deviations for only the smaller birth cohorts.

These findings suggest a variant age-crime pattern in relation to the age distribution of offenders by offence category and gender, which may be indicative of age-specific causes of crime. Such variations may, to some extent, underlie the variable support for the cohort density expression found in the analyses.

The next chapter continues the investigation of apprehension patterns for Western Australian birth cohorts, comparing the apprehension ratios of the four youngest cohorts.

Chapter Ten – Cohort Effects for Western Australia, 1994-2002: By Cohort

Having investigated aggregate and disaggregate apprehension ratios for Western Australian birth cohorts, 1994-2002, in Chapters 8 and 9, this chapter focuses on the set of apprehension trends for each birth cohort, by gender. This involves reorganising the data from Chapters 8 and 9 to compare the total and offence-specific apprehension trends for the youngest birth cohorts (born 1961-64, 1965-68, 1969-72, and 1973-76).

10.1 Male Apprehension Trends

Table 10.1.1, which shows total and offence-specific apprehension trends organised by male Western Australian cohorts, suggests that each cohort has experienced departures from the age-crime pattern (i.e. their ratios not declining as the cohorts have aged, and thus extending their participation in criminal activity beyond the young crime-prone ages). With one exception (being a significant departure in relation to sexual offences for the cohort born 1969-72), Chapters 8 and 9 suggested that all such departures have occurred across the period corresponding to 1998-2002. In this respect, the departures may be indicating a period effect. However, as the level of departure differs across cohorts and apprehension categories, any period effect has not been a common effect (such as a change in police surveillance strategies or the willingness of victims to report crimes). Rather, it would appear that some cohorts have experienced cohort effects.

Apprehension trends for the two cohorts that have experienced particularly high levels of cohort density (being the 'baby bust' cohorts born 1969-72 and 1973-76) show little evidence of a decline in ratios as they have aged. In fact, for these cohorts, a consistent rate of decline is indicated for only one apprehension category (being robbery and extortion). Rather, a departure from the age-crime pattern is shown for the majority of apprehension categories. The largest cohort, born 1969-72, has

experienced five substantial or significant departures from the age-crime pattern (i.e. apprehension ratios either increasing or being relatively stable for all categories except robbery and extortion), while the second-largest cohort, born 1973-76, has experienced only two, but shows three minor departures. Further, the level of departure for the two cohorts differs by apprehension category. For example, for three categories (offences against property, offences against the person, and total apprehensions), a substantial or significant departure is indicated for the cohort born 1969-72 compared to a minor departure for the cohort born 1973-76.

Table 10.1.1: Departures from the Age-Crime Pattern for Male Western Australian Birth Cohorts, 1994-2002.

	Born 1961-64	Born 1965-68	Born 1969-72	Born 1973-76
Against Property	Substantial	Substantial	Significant	Minor
Against Person	Minor	No	Substantial	Minor
Fraud and Misappropriation	Minor	Minor	Substantial	Significant
Sexual Offences	No	No	Significant	Substantial
Robbery and Extortion	Significant	Significant	No	No
Total Apprehensions	Minor	Minor	Substantial	Minor

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Notes: Significant = apprehension ratios increasing by more than five per cent, substantial = apprehension ratios increasing or declining by less than five per cent, and minor = reduction in the rate of decline of apprehension ratios of at least one-quarter.

Apprehension trends for the baby bust cohorts thus, on the whole, run counter to the age-crime pattern. Recalling that the cohorts born 1969-72 and 1973-76 are the largest and second-largest in Australia's history – and, thus, are leading and lagging edge cohorts – these findings suggest a strong association between high cohort density and crime (which is a little stronger for the leading edge cohort). The extent to which the association may also reflect relative disadvantage generated by high unemployment cannot be proven; however, both of these pivotal cohorts experienced a period of very high unemployment rates at a young age (the younger, lagging cohort edge cohort experiencing the highest cohort-specific unemployment rate at age 16-19 years, and the older, leading edge cohort at age 20-23 years).

The classic expression of the Easterlin (1987a) hypothesis informs us that, in comparison to the higher density cohorts, apprehension trends for the cohorts experiencing lower levels of cohort density and relative disadvantage (the smaller

cohorts born 1961-64 and 1965-68) should be more reflective of the age-crime pattern (i.e. their ratios declining as the cohorts have aged). From Table 10.1.1, each of these cohorts experienced two significant or substantial departures from the pattern. In addition, a consistent rate of decline in ratios is indicated twice for the cohort born 1965-68, but only once for the cohort born 1961-64. Therefore, apprehension trends for the older, smaller cohorts do appear to have been more reflective of the age-crime pattern than those of their younger and larger counterparts, providing further evidence for the cohort density expression.

In sum, apprehension trends for higher density male cohorts indicate departures from the age-crime pattern, and appear, generally, to have extended their participation in crime beyond anticipated levels to a greater extent, and more frequently, than smaller male cohorts. The cohort density expression of the age structure-crime pattern is thus supported. In this respect, large birth cohorts can be regarded as a potential source of variance to the age-crime pattern.

10.2 Female Apprehension Trends

All female Western Australian cohorts also appear to have experienced two or more departures from the age-crime pattern (Table 10.2.1). The two previous chapters indicated that such departures, which differ across cohorts and apprehension categories, occurred over the periods corresponding to both 1994-1998 and 1998-2002. In this respect, any period effect for females has not been a common effect; hence, the departures suggest that some cohorts experienced cohort effects.

Neither of the particularly high density cohorts (born 1969-72 and 1973-76) shows evidence of a consistent decline in ratios as the cohorts have aged. Thus, for females, the baby bust cohorts' apprehension trends contradict the age-crime pattern across all apprehension categories analysed, which suggests, again, a strong association between high cohort density and crime (and, theoretically, relative disadvantage generated by high unemployment). In all cases, the second-largest cohort, born 1973-76, has experienced significant departures from the pattern, while the largest, born

1969-72, experienced only two significant departures, but also two minor departures. Consequently, some difference in the level of departure across apprehension categories is evident for each of these cohorts, with the lagging edge cohort indicating the greater departures from the age-crime pattern.

Table 10.2.1: Departures from the Age-Crime Pattern for Female Western Australian Birth Cohorts, 1994-2002.

	Born 1961-64	Born 1965-68	Born 1969-72	Born 1973-76
Against Property	No	No	Significant	Significant
Against Person	Significant	Minor	Significant	Significant
Fraud and Misappropriation	Substantial	No	Minor	Significant
Sexual Offences	...	...	...	...
Robbery and Extortion	...	...	...	...
Total Apprehensions	Minor	Minor	Minor	Significant

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Notes: Significant = apprehension ratios increasing by more than five per cent, substantial = apprehension ratios increasing or declining by less than five per cent, and minor = reduction in the rate of decline of apprehension ratios of at least one-quarter.

In comparison to the higher density cohorts, apprehension trends for the older, smaller cohorts (born 1961-64 and 1965-68) are more reflective of the age-crime pattern. In particular, the latter cohort experienced no significant or substantial departures from the pattern, but in two cases a consistent rate of decline in its ratios as the cohort aged.

In sum, there is no evidence of apprehension trends for higher density female cohorts reflecting the age-crime pattern, and thus, these cohorts have been less reflective of the age-crime pattern than those of smaller female cohorts. Again, therefore, the cohort density expression of the age structure-crime pattern is supported, with large birth cohorts being regarded as a potential source of variance to the age-crime pattern.

10.3 Summary and Conclusions

Cohort-specific apprehension trends confirm that large birth cohorts have experienced cohort effects extending their participation in criminal activity.

Furthermore, their departures from the age-crime pattern have occurred to a greater extent, and more frequently, than those for smaller cohorts. Similarly, they have been less likely than smaller cohorts to experience a consistent rate of decline in their apprehension ratios. Therefore, the cohort density expression of the age structure-crime pattern (and the classic expression of the Easterlin hypothesis) is supported and, subsequently, large birth cohorts would appear to be a source of variance in the age-crime pattern.

Comparing the sets of cohort-specific male and female apprehension trends, some further observations can be made:

1. With regard to male apprehension trends, the cohort born 1969-72 experienced the highest level of departure from the age-crime pattern.
2. With regard to female apprehension trends, the cohort born 1973-76 indicates the most sizeable departures from the age-crime pattern.
3. From points 1 and 2, the leading edge cohort in this thesis (born 1969-72) shows the highest level of departure from the age-crime pattern in relation to male apprehension trends, while the lagging edge cohort (born 1973-76) shows the highest level of departure in relation to female apprehension trends. This finding may be indicating some difference between males and females with regard to either the underlying age distribution of offenders and/or the association between unemployment and crime.
4. For both sexes, the age-crime pattern is more evident for the cohort born 1961-64 than the cohort born 1965-68.
5. As discussed in Chapter 9, different cohorts (by period of birth and gender) have departed from the age-crime pattern for different offence categories.

This concludes this thesis's investigation of the cohort density expression of the age structure-crime pattern. The analysis now shifts its focus to the age composition expression (or the atypical expression of the Easterlin hypothesis), commencing with an exploration of aggregate apprehension trends for South Australia, by gender, 1987-1997 and 1998-2004, in Chapter 11.

Chapter Eleven – Compositional Effects for South Australia, 1987-2004: Total Apprehensions

This chapter focuses on the age composition expression of the age structure-crime pattern, in relation to aggregate South Australian apprehension levels, for males and females. The analysis is conducted separately for two periods: 1987-1997 and 1998-2004. This is because different counting rules were used in the collection of the apprehension data over the two specified periods (outlined in Chapter 6); subsequently, the periods 1987-1997 and 1998-2004 are not directly comparable. The analysis utilises comparative techniques (i.e. standardisation and decomposition), and apprehension data from *Crime and Justice in South Australia* (OCSAR 1988-2005) and population data from *Population by Age and Sex, Australian States and Territories* (ABS 2005a) (see Chapters 5 and 6). The data are disaggregated by seven age groups covering 14-80 years.

The results of three applications of standardisation are given: age-specific apprehensions, population size, and population age composition. The purpose of apprehension-standardisation is to ascertain what total apprehension numbers over time would have been had age-specific levels of either 1987 or 1998 prevailed over the relevant period (apprehension effects). Size-standardisation indicates potential apprehension numbers had population size been constant over time (size effects). Similarly, age-standardisation shows the influence of change in age composition (specifically an ageing population structure) on apprehension numbers over time (age composition effects). These analyses are subsequently refined by decomposition analysis to determine the contributions of changes in apprehension levels and age composition to the difference in crude ratios over time.

11.1 Male Apprehension Trends

This section examines the impact of changes in age-specific apprehension ratios, population size, and age structure on the total apprehension levels of the male South Australian population across the periods 1987-1997 and 1998-2004.

11.1.1 Apprehensions Standardised by Apprehension Levels

Figure 11.1.1.1 shows the number of apprehensions for South Australian males across the two periods 1987-1997 and 1998-2004, first at actual apprehension levels (per 100 persons), and secondly with the 1987 and 1998 levels held constant. The latter shows what the number would have been had there been no change in apprehension levels *per se*, with actual population size and age composition.

1987-1997: The data shows that the actual (observed) number of apprehensions increased from 15,004 to 23,622 across the period (an increase of 57 per cent), having grown rapidly between 1989 and 1993, but subsequently levelling off. However, had the 1987 apprehension level remained constant across the period, numbers would have been somewhat lower by 1997, falling steadily to 14,011 apprehensions (a decline of 41 per cent). Thus unspecific factors (such as a change in the level of crime reported to police, or police surveillance methods) have allowed apprehension ratios to increase across the 1987-1997 period.

1998-2004: The change in counting rules from 1997 to 1998 appears to have caused a small drop in observed numbers between these two years. There were 21,504 apprehensions in 1998 compared to 18,108 in 2004 – a reduction of 16 per cent – although numbers did increase between 1999 and 2002 (Figure 11.1.1.1). Therefore, in contrast to the earlier period, unspecified factors have allowed apprehension levels for males in South Australia to *decline* for the period 1998-2004. Conversely, numbers in 2004 would have been higher (by 20 per cent) had the 1998 total apprehension level remained constant, with 21,682 apprehensions by 2004, and relatively stable across the period.

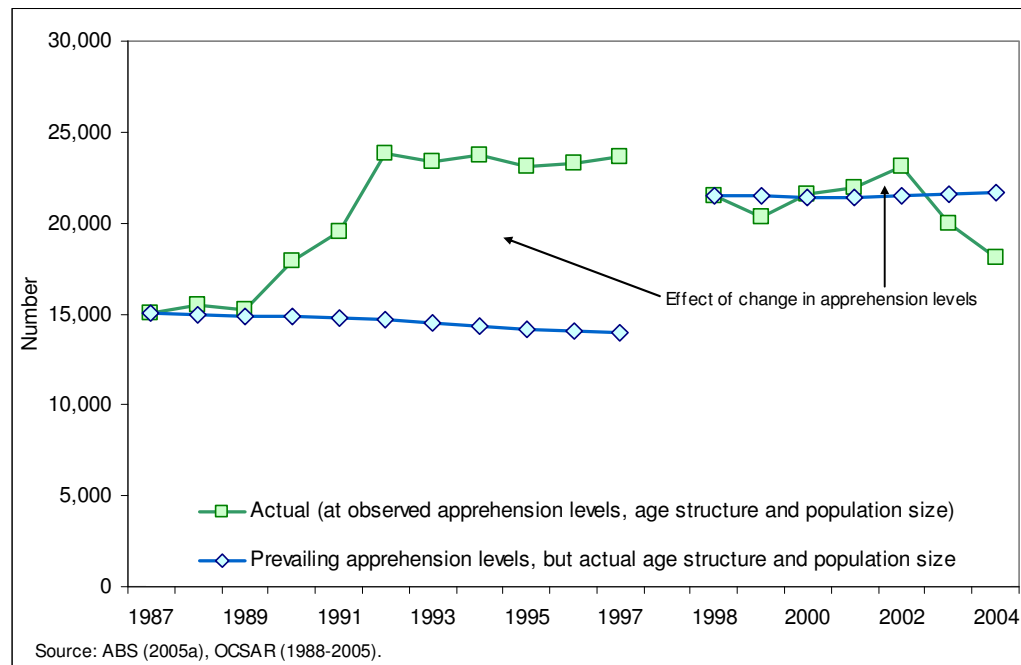


Figure 11.1.1.1: Male South Australian Apprehensions: Observed and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

11.1.2 Apprehensions Standardised by Population Size

Apprehension numbers for South Australian males, 1987-1997 and 1998-2004, are again shown in Figure 11.1.2.1 in relation to actual apprehension ratios per 100 males, as well as with the 1987 and 1998 population sizes held constant. The second set of numbers shows what apprehension levels would have been had the population not changed in size, with actual apprehension levels and age composition.

1987-1997: Had the 1987 population size remained constant, Figure 11.1.2.1 indicates that numbers would still have risen and fallen (as did actual numbers). However, they would be a little lower. By 1997, there would have been 22,276 apprehensions, or 5.7 per cent fewer than observed. Thus, as might be expected, population growth *per se* has had a small impact on apprehension trends (increasing them slightly).

1998-2004: Figure 11.1.2.1 similarly indicates that, had the size of the population in 1998 remained constant to 2004, numbers would have been a little lower than in

1998 (but followed a similar trajectory to that of actual numbers), and also would have declined by a further 4.0 per cent (to 17,397 apprehensions by 2004). Hence, population growth has again had a small positive impact on apprehension trends.

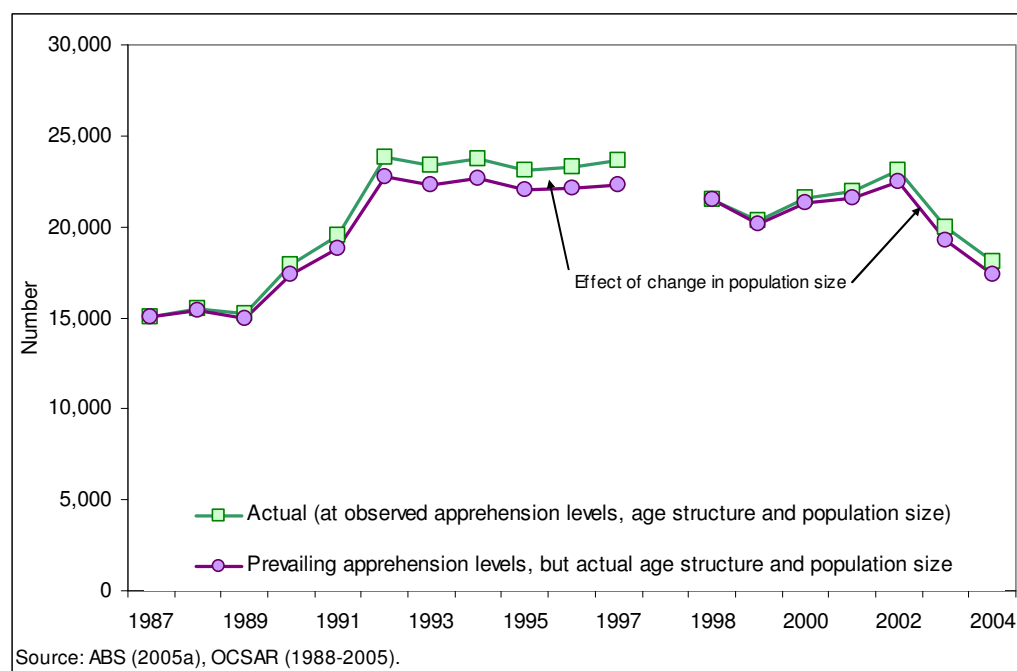


Figure 11.1.2.1: Male South Australian Apprehensions: Observed and Size-Standardised Numbers, 1987-1997 and 1998-2004.

11.1.3 Apprehensions Standardised by Age Composition

In addition to showing the number of apprehensions for South Australian males between 1987 and 1997, and 1998 and 2004, at actual apprehension ratios per 100, Figure 11.1.3.1 shows numbers held constant against the 1987 and 1998 age compositions. These numbers indicate what apprehension levels would have been had the population not aged structurally, with actual apprehension ratios and population size.

1987-1997: The age-standardised data indicates that although numbers would have increased in much the same way as observed numbers, they would have been higher (with 26,277 apprehensions by 1997) had the 1987 age composition remained constant (Figure 11.1.3.1). Therefore, age composition effects – that is, the decline in

young persons' share of the population age structure – contained apprehension numbers in 1997 by 10 per cent.

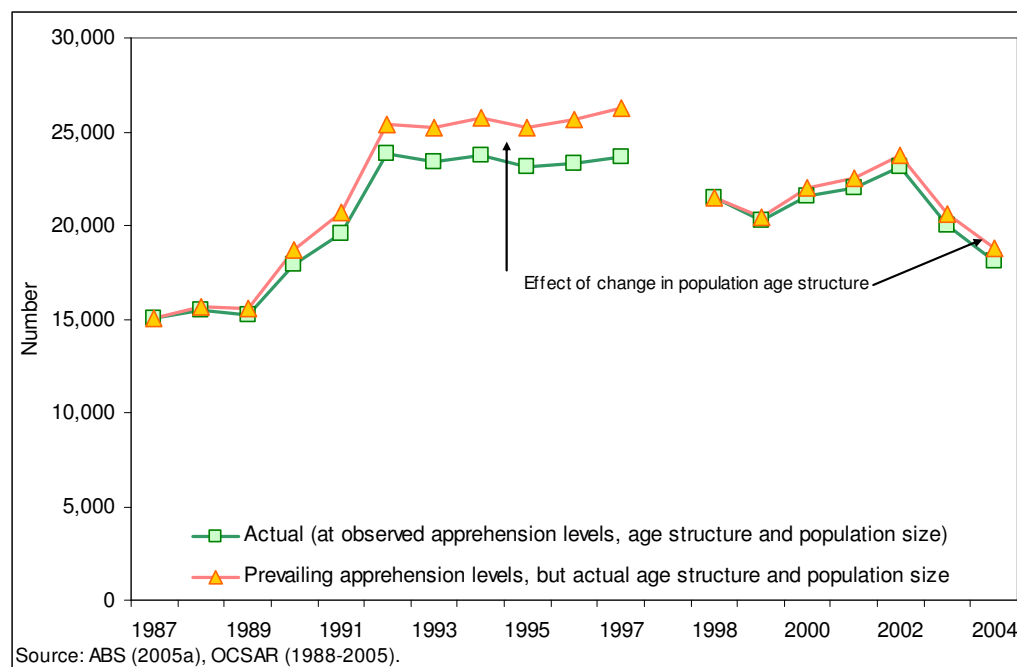


Figure 11.1.3.1: Male South Australian Apprehensions: Observed and Age-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: Actual and age-standardised apprehension numbers across the latter period similarly suggest that numbers would have been a little higher had the population not aged structurally, but followed the same trajectory as actual numbers (Figure 11.1.3.1). However, in this instance, the impact of age composition effects is relatively small; by 2004, there would have been 18,790 apprehensions had the 1998 age composition remained constant, an increase of 3.8 per cent.

Decomposition analysis refines this picture to some extent, although only in relation to changing age composition and apprehension levels. When the crude 1987 apprehension ratio (2.76 apprehensions per 100 males aged 14-80 years) is standardised to the (older) 1997 age composition, it declines to 2.43. Conversely, when the crude 1997 ratio (4.10) is standardised to the (younger) 1987 age composition, it increases to 4.56. This is basically showing that a younger age structure raises apprehension ratios, and an older age structure lowers them.

More specifically, Figure 11.1.3.2 shows the resulting contribution to the crude or net (observed) gap between the 1987 and 1997 apprehension ratios of 1.34 percentage points that is due to change in age composition, and the underlying or 'true' change in apprehension levels. The latter raised the crude gap by 1.73 percentage points, while structural ageing reduced it by 0.40 percentage points, resulting in the net observed gap (Figure 11.1.3.2). In other words, while changed apprehension levels contributed to a large underlying, or 'true', increase in the crude ratio (increasing the crude gap by 130 per cent), structural ageing contained such growth (by 30 per cent), which is consistent with the atypical expression of the Easterlin hypothesis (1987a).

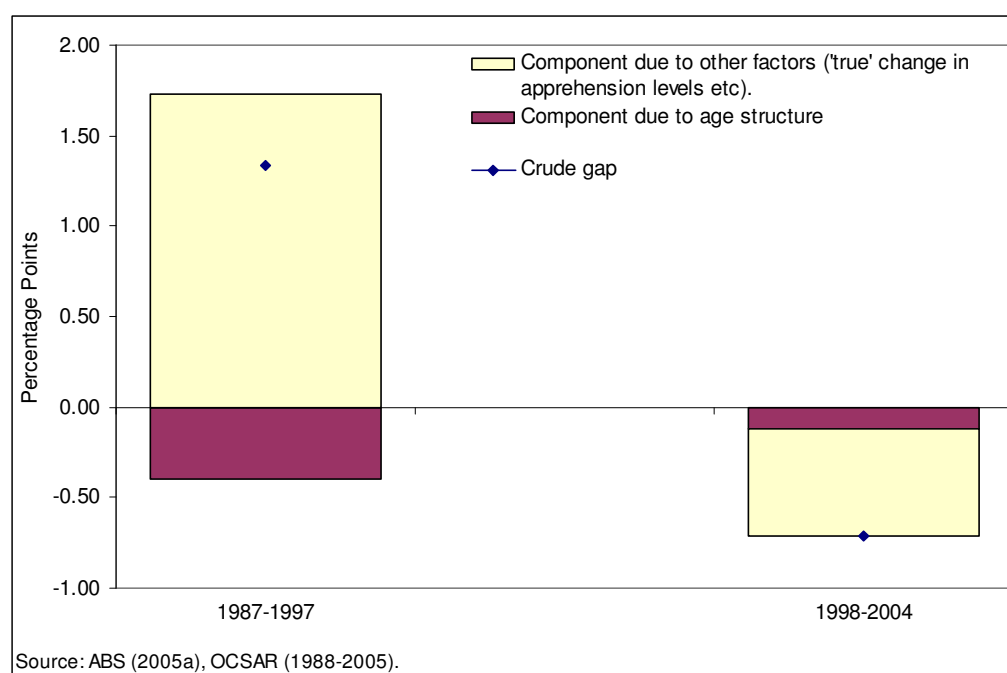


Figure 11.1.3.2: Male South Australian Apprehensions: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

Turning to the period 1998-2004, the crude ratio for 1998 similarly falls from 3.71 to 3.59 (per 100 of the population) when it is standardised to the (older) 2004 age composition, and the crude 2004 ratio increases from 3.00 to 3.11 when it is standardised to the (younger) 1998 age composition; hence, as indicated by standardisation analysis, a younger age structure raises apprehension ratios, and an older age structure lowers them. However for this period, decomposition indicates

that both changed apprehension and structural ageing components made negative contributions to the observed drop in the crude rate, which fell by 0.71 percentage points. Age composition accounted for 16 per cent of the reduction (0.12 percentage points), while an underlying decline in apprehension levels accounted for the remaining 84 per cent (0.60 percentage points). Thus age composition effects have again had a negative impact on apprehension levels, but now contribute to the decline rather than containing growth.

In sum, these three analyses have shown that the largest contributor to changing apprehension levels for South Australian males across the two periods has been apprehension levels *per se*. Population growth has contributed a small margin, while structural ageing has slightly constrained numbers, but constrained ratios more sizeably. Thus, the Easterlin hypothesis concerning the association between age composition and crime (that as the proportion of young persons in the population declines, so too will total offence ratios) is supported, but structural ageing is not the only (or the most influential) factor shaping apprehension trends.

11.2 Female Apprehension Trends

This section conducts the same analysis as above, but turns its attention to the female population of South Australia.

11.2.1 Apprehensions Standardised by Apprehension Levels

1987-1997: Figure 11.2.1.1 shows that actual numbers increased from 4,439 in 1987 to 6,652 in 1997 (by 50 per cent), although numbers did initially fall slightly, before a rapid rise between 1989 and 1993, and a subsequent levelling off. Had the 1987 apprehension level remained constant across the period, numbers would have been lower than observed, with 4,325 apprehensions by 1997 (or 35 per cent fewer apprehensions), and relatively stable across the period. Hence, as was seen for males over the same period, unspecified factors resulted in a large increase in apprehension ratios for females.

1998-2004: A small decline in numbers is again evident from 1997 to 1998, which may be related to the change in counting rules between these two years. Actual apprehension numbers in 2004 declined by 21 per cent (from 6,023 in 1998 to 4,673), despite an increase between 1999 and 2002, prior to a sharp drop (Figure 11.2.1.1). However, had the 1998 apprehension level remained constant across the period, numbers would have been both higher and stable over time. By 2004, numbers would have been around 6,028, or 29 per cent above the observed level. Therefore, as for males, unspecified factors have allowed female apprehension ratios to fall.

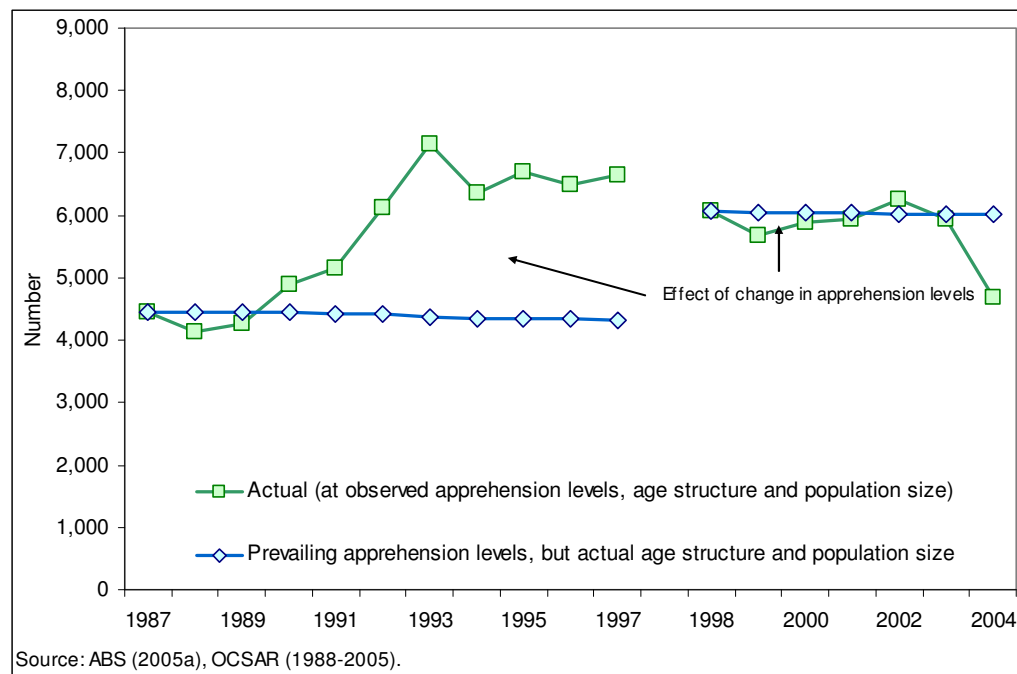


Figure 11.2.1.1: Female South Australian Apprehensions: Observed and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

11.2.2 Apprehensions Standardised by Population Size

1987-1997: Size-standardised numbers show that apprehension numbers would have both grown and declined in a similar manner to actual numbers over the period 1987-1997, but at a consistently lower level (Figure 11.2.2.1). Had the size of the population in 1987 remained constant, there would have been 6,229 apprehensions in 1997 (6.4 per cent less than observed). Thus, size effects have had a small, positive

impact on female apprehension trends (as for males) between 1987 and 1997 and, similarly, have been less influential than apprehension effects.

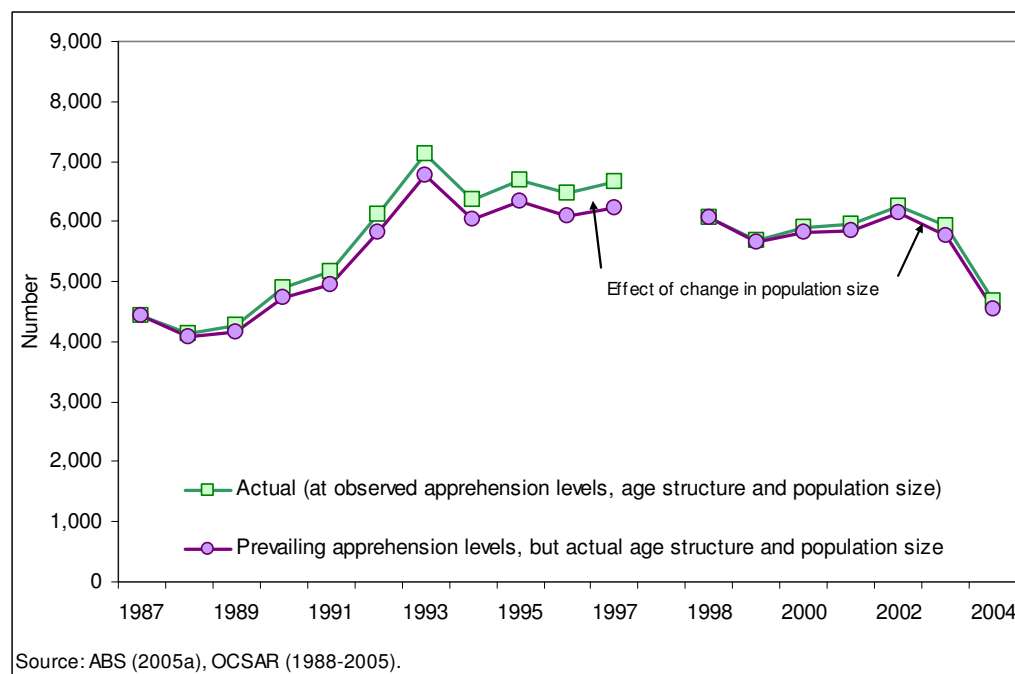


Figure 11.2.2.1: Female South Australian Apprehensions: Observed and Size-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: The difference between actual and size-standardised numbers across this period again indicates that the influence of size effects has been small, with the latter rising and falling in much the same way as the former. Had the size of the population in 1998 remained constant to 2004, there would have been only 3.0 per cent fewer apprehensions than observed, or 4,532 apprehensions by 2004 (Figure 11.2.2.1).

11.2.3 Apprehensions Standardised by Age Composition

1987-1997: Again (as for males) the data suggests that age composition effects have had a constraining impact on numbers, with age-standardised numbers following the same trajectory as actual numbers. Age-standardisation indicates that there would have been 7,338 apprehensions in 1997 had the population not aged structurally, or 9.3 per cent more than observed (Figure 11.2.3.1).

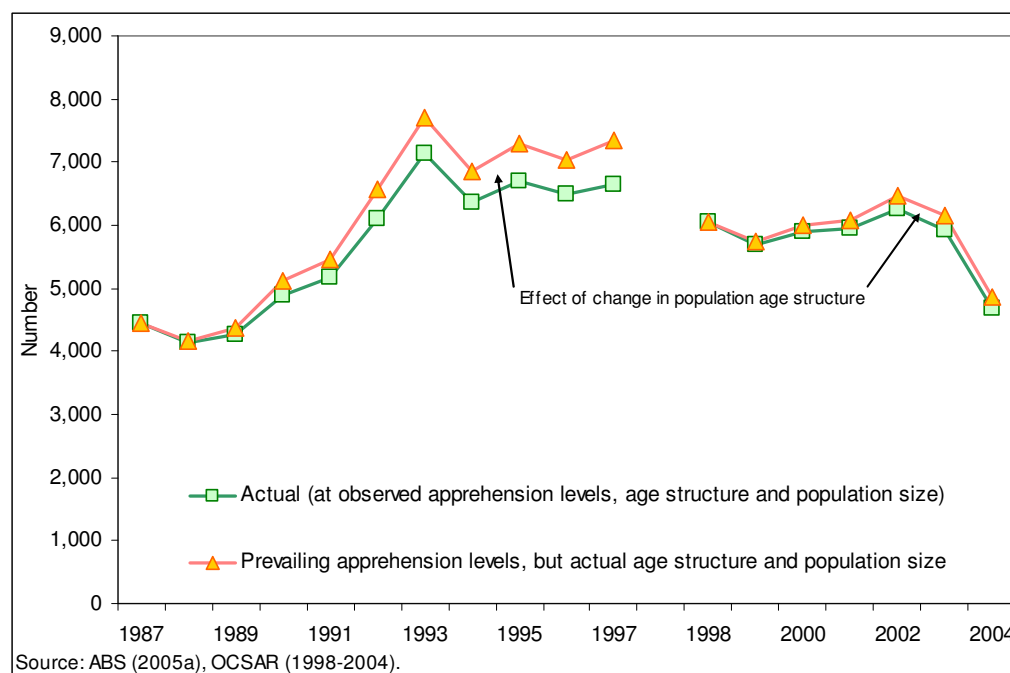


Figure 11.2.3.1: Female South Australian Apprehensions: Observed and Age-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: Age composition effects continue to demonstrate quite a small negative influence on apprehension numbers. Had the 1998 age composition remained constant, Figure 11.2.3.1 indicates that numbers would have risen and fallen as did actual numbers, and would have been only 3.9 per cent higher than observed, with 4,681 apprehensions by 2004.

Decomposition: Age-standardising the 1987 apprehension ratio to the older 1997 age composition, and the 1997 apprehension ratio to the younger 1987 age composition, shows that these apprehension trends are responsive to change in age composition; the former falls from 0.81 to 0.74 per 100 females, while the latter rises from 1.14 to 1.25 per 100 females. Decomposition of the crude gap in ratios at the beginning and end of the period (0.33 percentage points) suggests that an underlying change in female apprehension levels increased by 0.42 percentage points (129 per cent), which was offset by structural ageing by 0.09 percentage points (29 per cent) (Figure 11.2.3.2). This is a similar pattern to that observed for males, as is that with regard to the period 1998-2004.

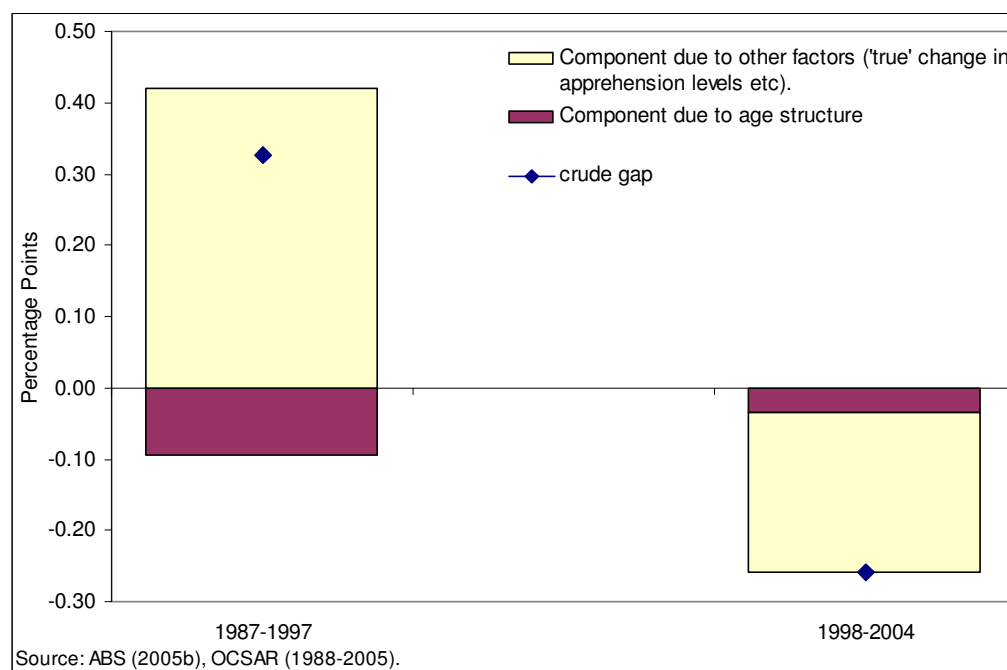


Figure 11.2.3.2: Female South Australian Apprehension: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

When the 1998 ratio (1.03 apprehensions per 100 females) is standardised to the (older) 2004 age composition, it declines to 0.99, while the 2004 rate (0.77 apprehensions per 100 females) increases to 0.80 when it is standardised to the (younger) 1998 age composition. From Figure 11.2.3.2, the net gap between the 1998 and 2004 rates (-0.26 percentage points) is mainly due to an underlying decline in apprehension levels, which reduced it by 87 per cent (0.23 percentage points), while structural ageing reduced it by a further 13 per cent (0.03 percentage points).

Thus, as was indicated for males, the three analyses indicate that the greatest contributor to change in apprehension numbers for South Australian females across the two periods was changing apprehension levels *per se*. By contrast, population growth played a small role in increasing numbers, while structural ageing played a slightly larger role in reducing numbers (but constrained ratios more sizeably). Again, therefore, the age composition expression (that change in population age structure will be concurrent with change in total apprehension levels) is supported, but the declining proportion of young persons has not been the only (or the greatest) contributor to change.

11.3 Summary and Conclusions

The periods 1987-1997 and 1998-2004 cannot be directly compared due to different counting rules. Nonetheless, similar trends emerge across the two periods:

1. Observed numbers tend to increase and decline across the periods analysed, but do so differently by period, and to a lesser degree by gender.
2. A small decline in numbers between the end and beginning of the two periods is evident, which may be accounted for by the change in counting rules from 1997 to 1998.
3. From point 2, the change in counting rules has caused the apprehension-standardised numbers to rise between the two periods.
4. Apprehension effects (change in apprehension levels) had a large impact on apprehension trends across gender and time, and are by far the biggest contributor to change in apprehension levels;
5. Size effects (population growth) had a minor (positive) impact on apprehension trends across gender and time, and the least influence on apprehension trends of the three effects; and
6. The impact of age composition effects (structural ageing) indicated some variance across change in numbers and crude ratios:
 - (i) Age-standardisation indicates that changing age composition has generally had quite a small impact on apprehension numbers, particularly between 1987 and 1997.
 - (ii) Decomposing the gap in crude ratios, on the other hand, suggested that changing age composition had a more sizeable impact, particularly across the earlier period.
 - (iii) Most importantly, however, age composition effects were always found to have a negative (reducing) impact on apprehension levels. That is, apprehension levels would have been higher than observed in the absence of structural ageing. Thus, the age composition expression of the age structure-crime pattern is supported (and hence the atypical expression of the Easterlin hypothesis).

The following chapter continues the retrospective investigation of the age composition expression, shifting the focus from total apprehensions to offence-specific apprehensions for South Australians.

Chapter Twelve – Compositional Effects for South Australia 1987-2004: By Offence Category

Continuing on from Chapter 11, this chapter focuses on age composition effects, comparing these with size and apprehension effects, in relation to South Australian apprehensions, by offence category and gender, for the periods 1987-1997 and 1998-2004. The five offence categories examined are: offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion. The analytical techniques and data sources are the same as those applied in Chapter 11.

12.1 Offences Against Property

This section focuses on offences against property, which, from Chapter 7, is the largest of the five offence categories considered in this analysis. It accounted for more than one-half of all apprehensions in South Australia between 1987 and 2004.

12.1.1 Male Apprehension Trends

Figure 12.1.1.1 shows four series of apprehension numbers in relation to offences against property for South Australian males across the periods 1987-1997 and 1998-2004: first, at actual (observed) annual apprehension numbers; second, with age composition held constant at its respective 1987 and 1998 levels (but actual population size and apprehension levels); third, with population size held constant at its respective 1987 and 1998 levels (but actual age composition and apprehension levels); and, fourth, with apprehension levels held constant at its respective 1987 and 1998 levels (but actual age composition and population size).

1987-1997: For the period 1987-1997, the data shows that actual numbers for this offence category increased substantially from 10,013 to 11,876 (or by 19 per cent), having first grown dramatically through to 1992 (which may be due to the efforts of

the South Australia Police's Organised Crime Task Force [South Australia Police (SAPOL) 1992]), but subsequently declining. Had the 1987 age composition remained constant (i.e. had the proportion of young persons not declined), numbers in 1997 would have been somewhat higher than observed (by 13 per cent) with 13,598 apprehensions, albeit following the same trajectory as observed numbers. By comparison, had the 1987 population size remained constant, but actual age structure and apprehension levels unfolded, numbers in 1997 would have been 5.7 per cent lower than actually observed (11,199 apprehensions), while had the 1987 apprehension rates remained constant (but actual age structure and population size unfolded), numbers would have been 23 per cent lower (9,202 by 1997) and moreover would have experienced a steady decline.

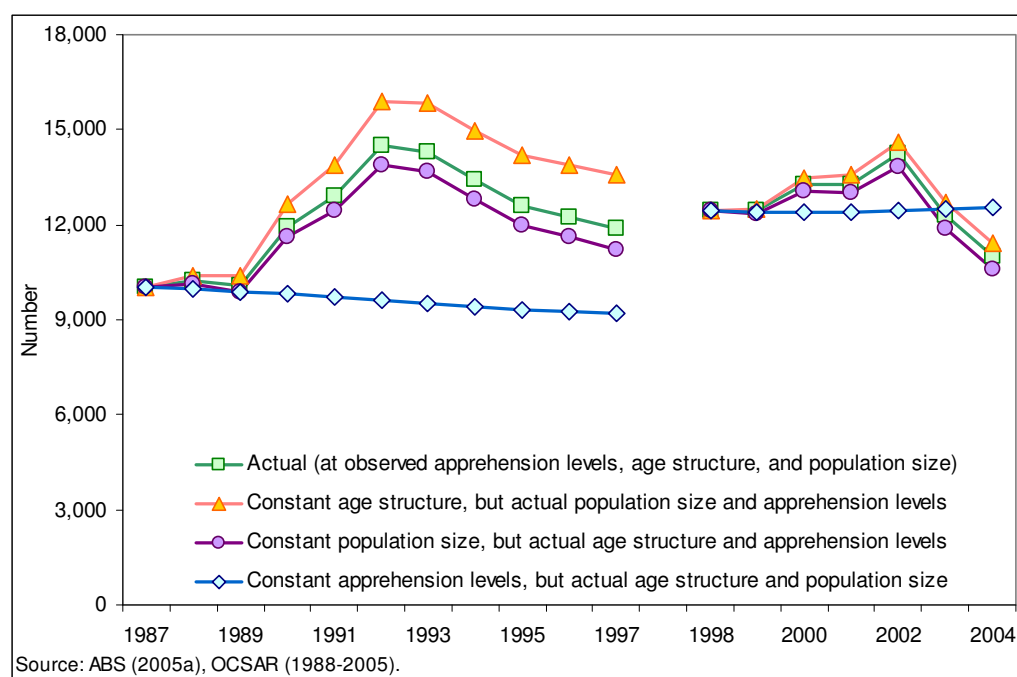


Figure 12.1.1.1: Male South Australian Apprehensions, Offences Against Property: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

Structural ageing thus clearly constrained growth in apprehension numbers for (male) offences against property across the period, and the impact increases over time, both of which support Easterlin's (1987a) arguments concerning the association between age composition and crime. However, the trend follows the same trajectory as actual numbers, which means that it does not explain why they peaked in 1992

and declined thereafter. Similar can be said when population size is held constant: numbers would be lower but increase and decline in an almost identical manner to observed numbers. By contrast, the increase and peak in numbers, and decline thereafter, is primarily the result of changed apprehension levels *per se*.

1998-2004: The contribution of age composition to changing apprehension levels is somewhat less pronounced across the 1998-2004 period (also Figure 12.1.1.1). The change in counting rules resulted in a small increase in actual (observed) numbers from 1997 to 1998 for offences against property, which fell overall by 11 per cent (from 12,431 to 11,017) between 1998 and 2004, despite growing between 1999 and 2002. While the initial growth in numbers may be indicative of Operation Vigil, which was introduced by South Australia Police in 1999 to target motor vehicle theft-related offences, the subsequent decline may be related to a proposed increase in collecting DNA samples and use of associated data bases (SAPOL 2002, 2003). Both age- and size-standardised numbers indicate a small contribution to apprehension trends over this particular period; had the 1998 age composition remained constant, numbers would have been higher in 2004 by 3.6 per cent (11,426 apprehensions), while had size remained constant numbers would have been lower by 4.0 per cent (10,573 apprehensions). Again, however, changing apprehension levels have had the greater impact; numbers in 2004 would have been 14 per cent higher, at 12,557 apprehensions, had 1998 apprehension levels prevailed.

Decomposition analysis permits some refinement to this analysis, albeit for age structure and apprehension levels only. When the crude 1987 apprehension ratio (1.84 per 100 males aged 14-80 years) is standardised to the (older) 1997 age composition, it declines to 1.60, while when the crude 1997 ratio (2.06) is standardised to the (younger) 1987 age composition, it increases to 2.36; hence, as indicated above, apprehension ratios for offences against property are raised by a younger age composition, and lowered by an older one. Figure 12.1.1.2 shows the resulting contribution to the crude or net (observed) gap of 0.22 percentage points that is due to change in age composition, and the underlying or 'true' change in apprehension levels. The latter raised the crude gap by 0.49 percentage points (or 225

per cent), while structural ageing reduced it by 0.27 percentage points (or 125 per cent), resulting in the net observed gap.

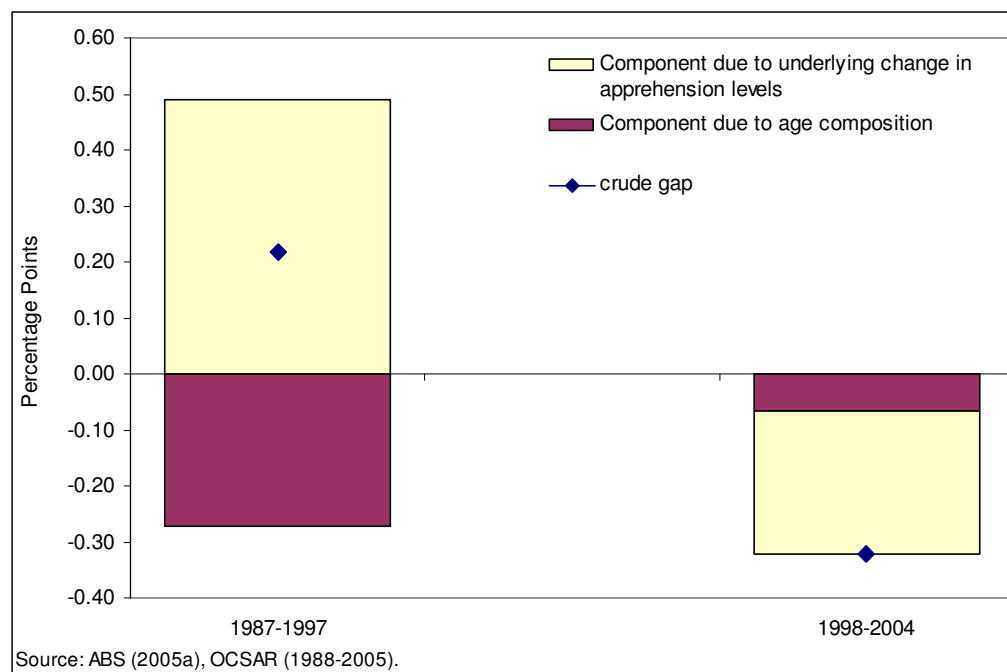


Figure 12.1.1.2: Male South Australian Apprehensions, Offences Against Property: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

Turning to the 1998-2004 period, the crude ratio for 1998 similarly declines when standardised to the older 2004 age structure (from 2.14 to 2.08), and the rate for 2004 increases when standardised to the younger 1998 age structure (from 1.82 to 1.89). However for this period, decomposition shows that both age composition and apprehension levels made negative contributions to the observed gap, which declined by 0.32 percentage points. Structural ageing accounted for 21 per cent of the reduction (0.07 percentage points) while an underlying decline in apprehension numbers accounted for the remaining 79 per cent (0.25 percentage points) (also Figure 12.1.1.2). Again this finding concurs with the atypical expression of the Easterlin hypothesis, but with age composition effects now contributing to the decline in apprehension numbers rather than containing growth.

12.1.2 Female Apprehension Trends

1987-1997: Actual female apprehension numbers for offences against property declined from 3,461 in 1987 to 3,257 in 1997 (by 5.9 per cent overall), having grown sharply between 1988 and 1993, but declining thereafter (Figure 12.1.2.1). Numbers would have been somewhat higher (by 11 per cent) had the 1987 age composition remained constant, with 3,637 apprehensions by 1997, but following the same trajectory as observed numbers. Conversely, had the 1987 population size remained constant (but actual age structure and apprehension levels unfolded) numbers would have been 6.4 per cent lower than actually observed (3,050 apprehensions by 1997). If 1987 apprehension levels had remained constant (but actual age structure and population size unfolded) numbers would have been 4.0 per cent higher (3,387 apprehensions by 1997).

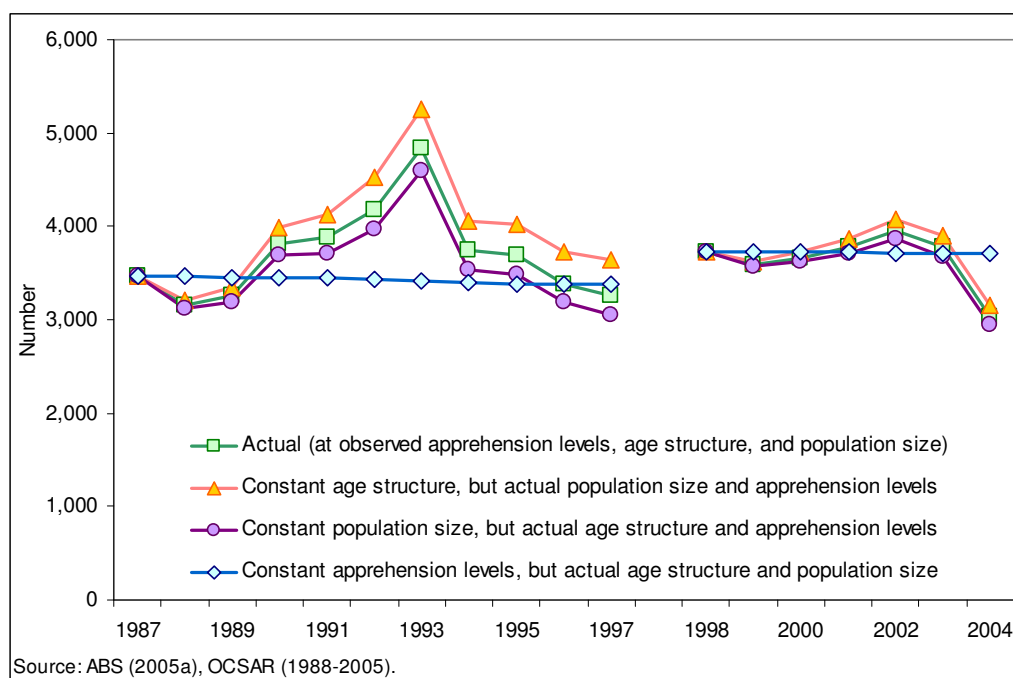


Figure 12.1.2.1: Female South Australian Apprehensions, Offences Against Property: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

It is evident, therefore, that structural ageing has (again) constrained growth in apprehension numbers for offences against property across the period (as it did for males), and the impact increases over time, both of which support the age composition expression of the age structure-crime pattern. It does not, however,

explain the peak in numbers in 1993, and subsequent decline, because the trend follows the same trajectory as actual numbers. This also applies when population size is held constant: numbers would be lower but increase and decline in an almost identical manner to observed numbers. On the other hand, changes in apprehension levels appear to be the main factor underlying the increase and peak in numbers, and the rapid decline from the peak.

1998-2004: Actual numbers also fell between 1998 and 2004, by 18 per cent overall (from 3,723 to 3,040), but primarily between 2003 and 2004, with the change in counting rules causing a sizeable increase in such numbers between 1997 and 1998. Both age- and size-standardised numbers indicate a small contribution to apprehension trends over this particular period; numbers in 2004 would have been 3.7 per cent higher (3,156 apprehensions) had the 1998 age structure remained constant, while numbers would have been 3.0 per cent lower (2,948 apprehensions) had size remained constant. Again, however, changing apprehension effects indicate the most influence; had 1998 apprehension levels prevailed, numbers would have been 22 per cent higher (3,709 apprehensions by 2004).

Decomposition: Of importance is that for females, observed apprehension numbers experienced overall decline across both periods. Refining this analysis through decomposition analysis (in relation to age composition and apprehension levels only), when the crude 1987 apprehension ratio (0.63 per 100 females aged 14-80 years) is standardised to the (older) 1997 age composition, it declines to 0.58, while when the crude 1997 rate (0.56) is standardised to the (younger) 1987 age composition it increases to 0.62; thus, as for males, apprehension ratios for offences against property are forced up by a younger age composition, and forced down by an older one. The contribution to the observed (actual) gap, which declined by 0.07 percentage points, that is due to change in age composition, and the underlying change in apprehension numbers, is shown in Figure 12.1.2.2. Structural ageing accounted for 78 per cent of the reduction (0.059 percentage points), while an underlying decline in apprehension levels accounted for the remaining 22 per cent (0.021 percentage points).

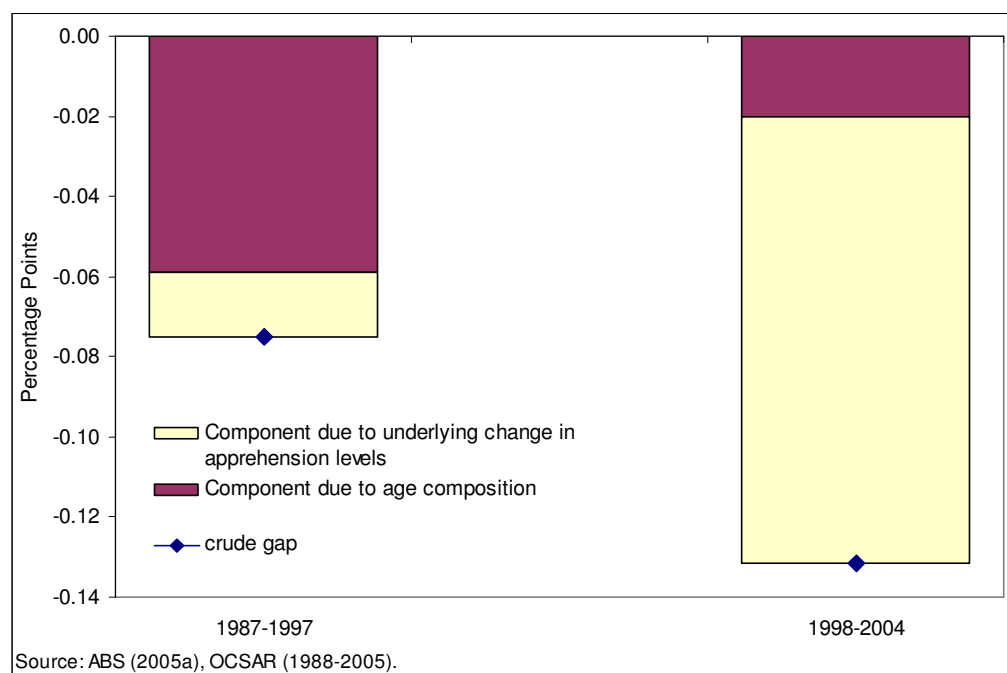


Figure 12.1.2.2: Female South Australian Apprehensions, Offences Against Property: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

With regard to the period 1998-2004, the crude ratio for 1998 similarly declines when it is standardised to the older 2004 age composition (from 0.63 to 0.61), and the ratio for 2004 increases when standardised to the younger 1998 age composition (from 0.50 to 0.52). Again decomposition indicates that both structural ageing and apprehension levels made negative contributions to the observed gap, which declined by 0.13 percentage points. In keeping with the pattern for males, the latter accounts for the more sizeable reduction; underlying decline in apprehension levels accounted for 85 per cent of decline (0.11 percentage points), while changed age composition accounts for the remaining 15 per cent (0.02 percentage points) (also Figure 12.1.2.2). Again this finding concurs with the age composition expression of the age structure-crime pattern, but with age composition effects for both periods contributing to the decline in apprehension numbers rather than containing growth.

12.2 Offences Against the Person

South Australian apprehension trends relating to offences against the person are the subject of this section. This is the second largest offence category in South Australia; Chapter 7 indicated that it accounted for approximately one-quarter of all apprehensions in the region across the period 1987-2004.

12.2.1 Male Apprehension Trends

1987-1997: Figure 12.2.1.1 shows that the observed number of male South Australian apprehensions for offences against the person increased by 65 per cent (from 3,538 to 5,855) across the period 1987-1997, with an accelerated period of growth between 1987 and 1994 (the South Australia Police noting an increase in reports of personal violence incidents around this time (SAPOL 1995)). Standardisation analysis shows that if the population had not aged structurally over this time, numbers in 1997 would have been 8.5 per cent higher than observed, with 6,396 apprehensions. By contrast, had the population not grown in size, numbers in 1997 would have been lower by 5.7 per cent (5,521 apprehensions) while if 1987 apprehension levels had remained constant, numbers would have been lower than observed by 42 per cent (with 3,380 apprehensions). In each case these findings are similar to those for offences against property, with age- and size-standardised trends closely approximating observed numbers; the former above and the latter below, actual numbers, and change in apprehension levels (indicated by holding these constant) accounting for most of the increase. However, in the present case, apprehension numbers peak slightly later (1994) than for offences against property, and do not decline from their peak to the same extent.

1998-2004: Standardisation for the period 1998-2004 similarly shows a small effect from both changing age composition and size. Actual numbers for offences against the person declined overall by 10 per cent, from 5,696 to 5,143, after rising and peaking in 2002 (for which South Australia Police annual reports provide no possible explanation), having declined a little between 1997 and 1998 as a result of the change in counting rules. Had the 1998 age composition remained constant (at actual population size and apprehension levels), numbers would have been higher by 3.9

per cent (reaching 5,352 apprehensions in 2004), while had population size remained constant (with actual age structure and apprehension rates) they would have been lower by 4.0 per cent (4,936 apprehensions in 2004). A more substantial influence for apprehension levels is again suggested; had 1998 apprehension levels remained constant (with actual age composition and population size) there would have been 5,720 apprehensions in 2004, 11 per cent more than observed. Thus declining apprehension levels are again the largest contributor to overall change in apprehension numbers.

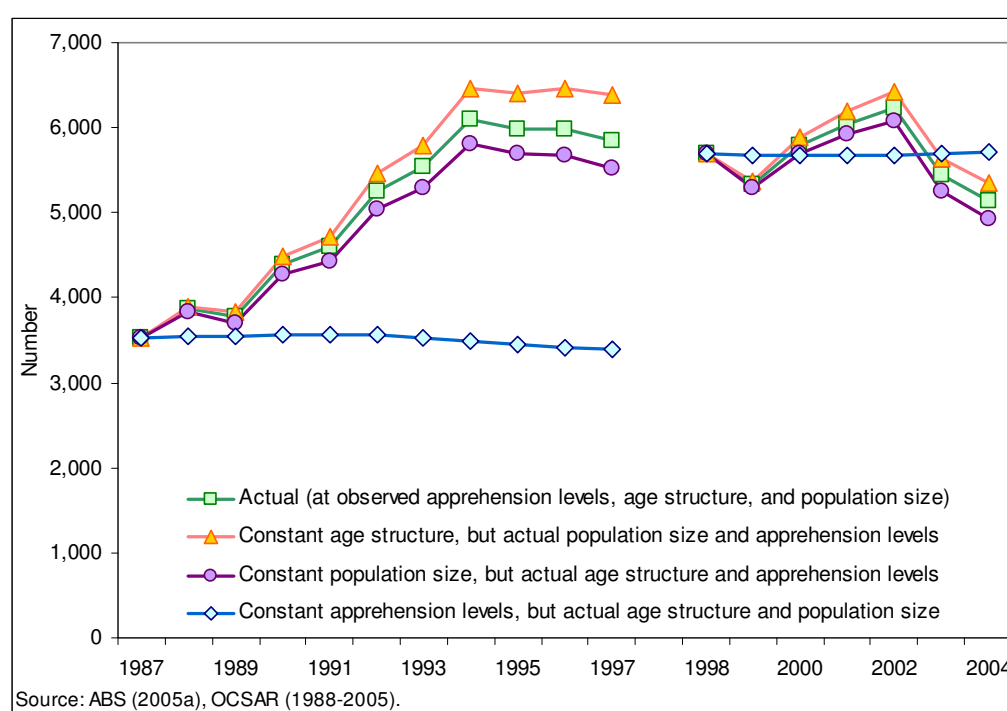


Figure 12.2.1.1: Male South Australian Apprehensions, Offences Against the Person: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

Decomposition: Age-standardising the 1987 apprehension ratio for offences against the person to the older 1997 age composition, and the 1997 apprehension ratio to the younger 1987 age composition, again shows that these apprehension trends are responsive to change in age composition, the former falling from 0.65 to 0.59 (per 100 males), and the latter increasing from 1.02 to 1.11 (per 100 males). Decomposition of the crude gap in ratios between the beginning and end of the period (0.37 percentage points) suggests that an underlying change in apprehensions

in fact increased by 0.444 percentage points (121 per cent), while age composition offset this by 0.078 percentage points (21 per cent) (Figure 12.2.1.2).

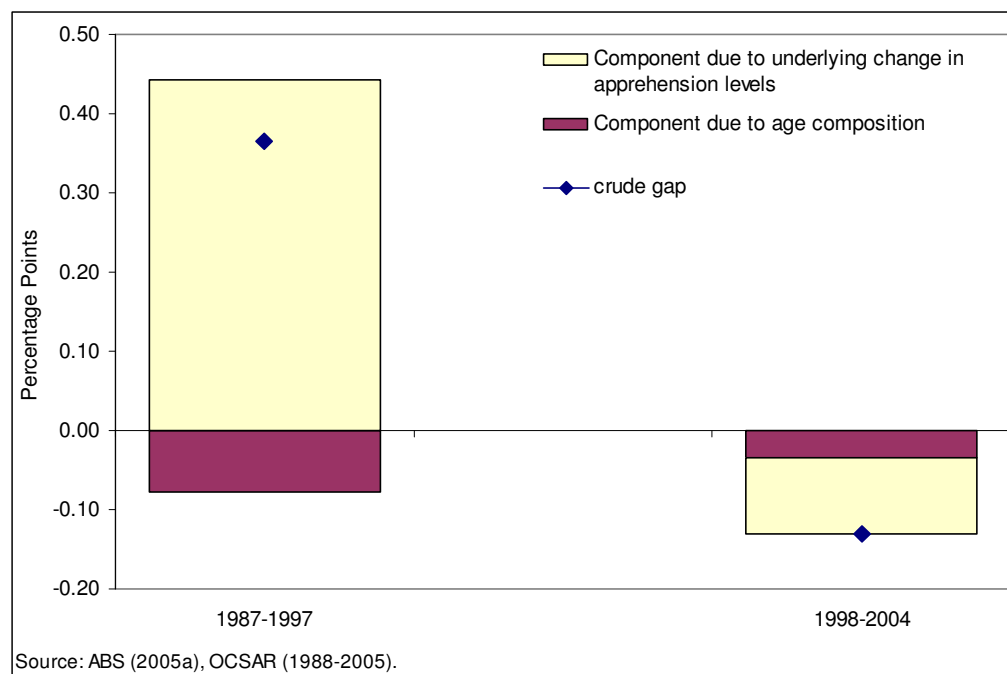


Figure 12.2.1.2: Male South Australian Apprehensions, Offences Against the Person: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

This is a similar pattern to that observed for offences against property, as is that for the period 1998-2004. When the 1998 ratio (0.98) is standardised to the 2004 age composition, it declines to 0.95, while the 2004 ratio (0.85) increases to 0.89 when it is standardised to the 1998 age composition. The net gap in the crude ratio between 1998 and 2004 (-0.13 percentage points) is the result of an underlying decline in apprehension numbers which reduces it by 0.096 percentage points (73 per cent), and age composition which reduces it by a further 0.035 percentage points (27 per cent).

12.2.2 Female Apprehension Trends

1987-1997: Females experienced a dramatic increase in actual apprehension numbers for this offence category, from 489 to 1,159 (by 137 per cent) across the 1987-97 period, with an accelerated period of growth between 1987 and 1994 and a small decline thereafter (Figure 12.2.2.1). Standardisation shows that numbers would have been 10.4 per cent higher than observed numbers (1,293 apprehensions by 1997) had

the 1987 age composition remained constant. By comparison, numbers in 1997 would have been 6.4 per cent lower (1,085 apprehensions) had the 1987 population size remained constant, but 60 per cent lower (463 apprehensions) had 1987 apprehension levels remained. Age- and size-standardised trends thus unfold in a similar manner to observed numbers (i.e. as for offences against property); the former above, and the latter below, actual numbers. While change in apprehension levels clearly account for most of the increase (as for males), of note is that apprehension numbers peak a little later (1995) for this offence category than for offences against property, but similarly increase steadily to their peak and subsequently decline at a reduced level.

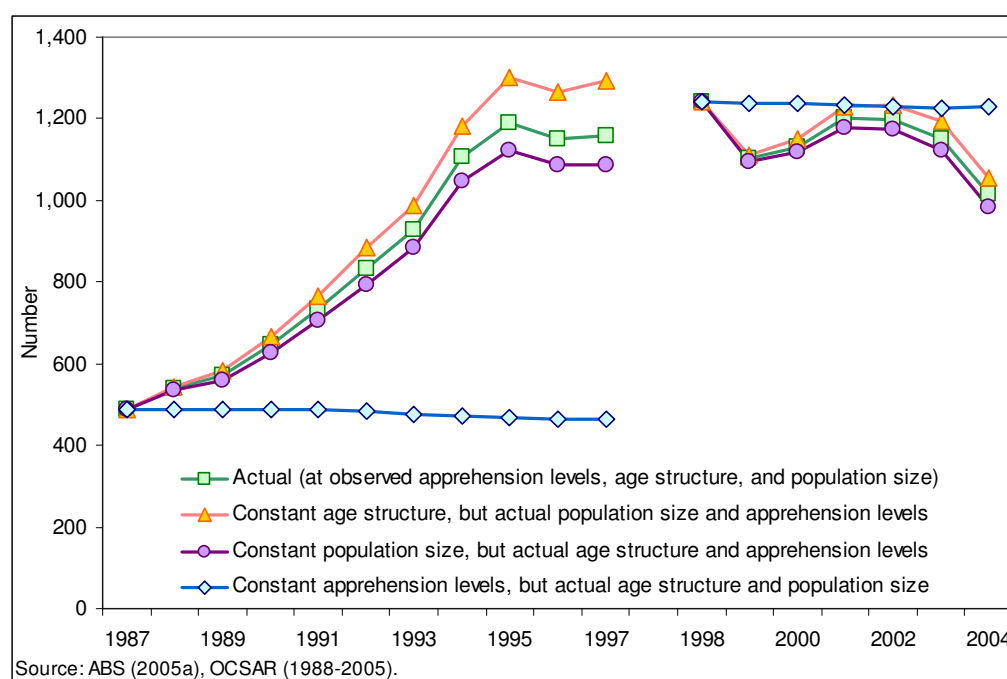


Figure 12.2.2.1: Female South Australian Apprehensions, Offences Against the Person: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: Altered counting rules appear to have caused a small rise in observed numbers between 1997 and 1998 for offences against the person (females). However, numbers dropped from 1,241 to 1,016, an overall decline of 18 per cent for the period 1998-2004, but also fluctuated. Standardisation analysis indicates changing age composition and population size again made a small contribution to changing apprehension levels. Had the population not aged structurally across this period,

numbers would have been higher by only 3.6 per cent (1,053 apprehensions in 2004), while had the population not grown in size, numbers would have been 3.0 per cent lower (985 apprehensions in 2004). Changing apprehension levels again indicate a more sizeable impact; had these not have changed (but actual age composition and population size), numbers in 2004 would have been higher than observed by 21 per cent (1,228 apprehensions). Thus declining apprehension levels are again the largest contributor to overall change in apprehension numbers, and would appear to account for the fluctuations in actual numbers.

Decomposition: Age-standardising the 1987 apprehension ratio for this offence category to the older 1997 age composition, and the 1997 apprehension ratio to the younger 1987 age composition – both ratios being per 100 of the population – again shows that these apprehension trends are responsive to change in age composition. The former drops from 0.09 to 0.08, while the latter increases from 0.20 to 0.22. Figure 12.2.2.2 shows that decomposition of the crude gap at the beginning and end of the period (0.11 percentage points) indicates that underlying change in apprehension levels increased by 0.13 percentage points (115 per cent), but was offset by structural ageing by 0.02 percentage points (15 per cent). This differs to the pattern for (female) offences against property (where overall numbers declined), but reflects that of males in relation to both offences against property and offences against the person.

The pattern relating to the period 1998-2004 is similar. The 1998 ratio declines from 0.210 to 0.202 when it is standardised to the 2004 age composition, while the 2004 ratio rises from 0.167 to 0.173 when it is standardised to the 1998 age composition. The (very small) net gap across this period (-0.04 percentage points) is primarily the result of an underlying change in apprehension numbers; while this factor reduced the gap by 83 per cent (0.03 percentage points), age composition reduced it by an additional 17 per cent (0.01 percentage point).

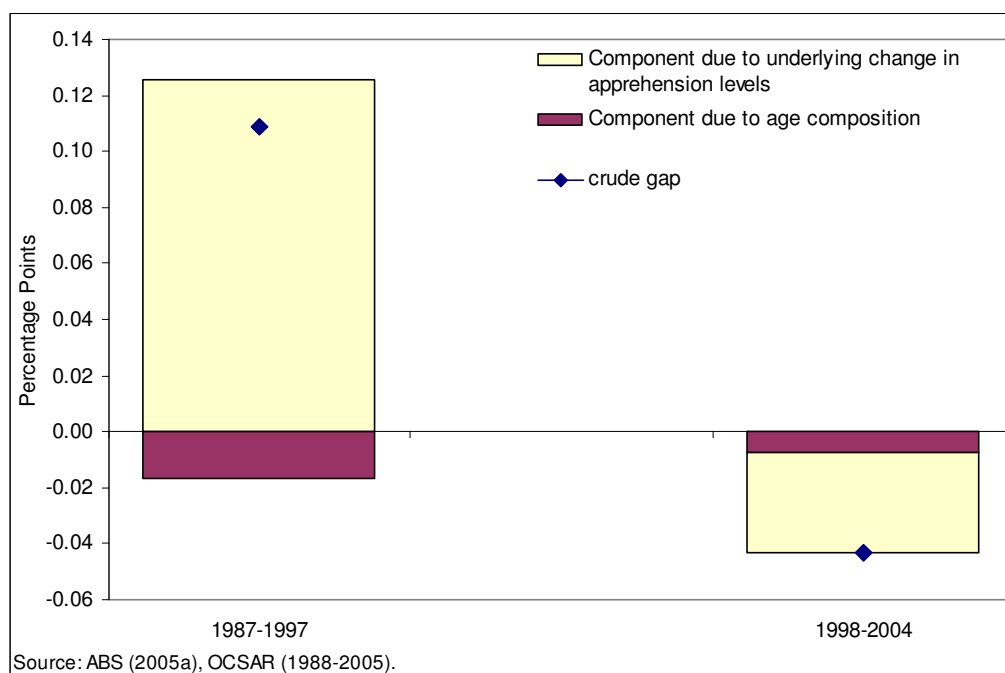


Figure 12.2.2.2: Female South Australian Apprehensions, Offences Against the Person: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

12.3 Fraud and Misappropriation

This section examines apprehension trends for fraud and misappropriation, being the third largest offence category in the standardisation analysis, and accounting for up to one-quarter of all apprehensions in South Australia between 1987 and 2004 (see Chapter 7).

12.3.1 Male Apprehension Trends

1987-1997: Figure 12.3.1.1 shows that across the period 1987-1997 the observed number of male apprehensions in relation to fraud and misappropriation increased from 867 to 4,949, an overall increase of 471 per cent with an accelerated period of growth between 1991 and 1997. Such growth may be indicative of the growing use of plastic card payment systems, the internet, and the like, that is associated with an increasing prevalence of electronic-related fraud and cybercrime (see Smith 1997 and 1998); this may also explain why for this offence category, the peak (in 1997) is somewhat later, and the difference between actual and apprehension-standardised numbers is so great. Had the 1987 age composition remained constant, numbers in

1997 would have been higher than observed by 6.1 per cent (5,272 apprehensions). Conversely, had the 1987 population size remained constant, numbers in 1997 would have been 5.7 per cent lower than observed (4,667 apprehensions), while had 1987 apprehension levels remained constant, numbers in 1997 would have been 83 per cent lower (843 apprehensions). Each of the standardisation analyses reflects the findings for the two previous offence categories; age- and size-standardised numbers follow the same trajectory as actual numbers (the former slightly higher, and the latter slightly lower, than observed numbers), while changing apprehension levels display the greater impact.

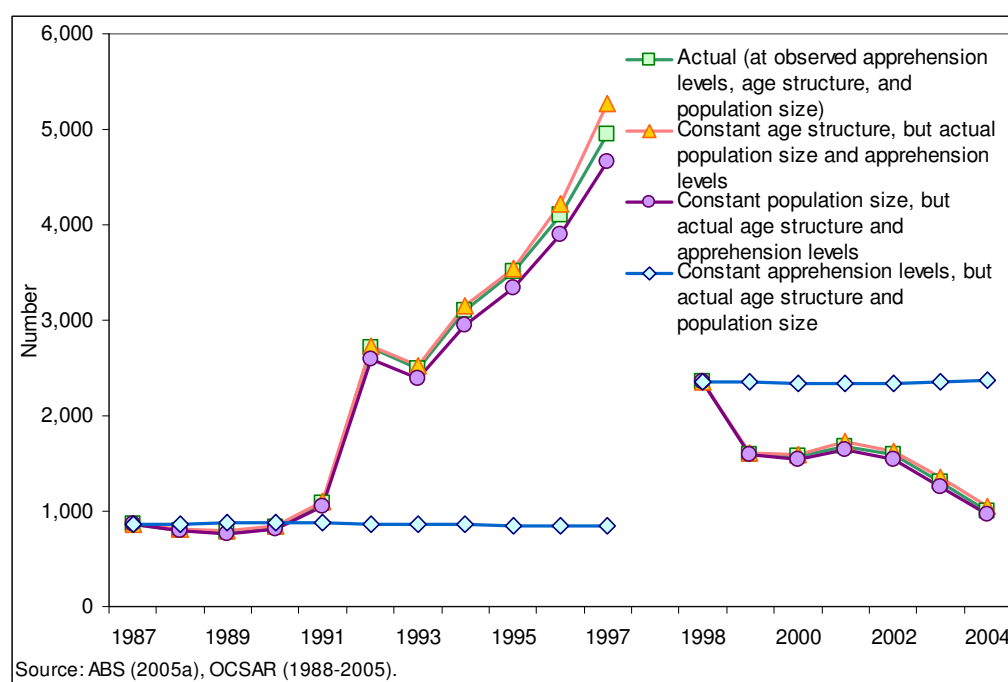


Figure 12.3.1.1: Male South Australian Apprehensions, Fraud and Misappropriation: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: While Figure 12.3.1.1 suggests that the change in counting rules may have caused a very large drop in recorded apprehension numbers from 1997 to 1998, it also shows that the contribution to changing apprehension levels from change in age composition and population size is similarly low between 1998 and 2004. Numbers fell overall by 57 per cent, from 2,363 to 1,007 across this period, following an accelerated period of decline commencing 2002; the Electronic Crime Strategy introduced by South Australia Police in 2001 may have made a contribution

to this decline (SAPOL 2002). By 2004 numbers would have been 4.3 per cent higher (1,052 apprehensions) than observed had age composition remained constant, while numbers would have been 4.0 per cent lower (966 apprehensions) had population size remained constant. However, had 1998 apprehensions levels remained constant (indicated by holding these constant) numbers in 2004 would have been much higher than observed, with 2,366 apprehensions, an increase of 135 per cent. Therefore, changing apprehension levels can again be regarded as the greatest contributor to change in (male) apprehension levels for fraud and misappropriation.

Decomposition: Age-standardising the 1987 apprehension ratio for fraud and extortion to the older 1997 age composition, and the 1997 apprehension ratio to the younger 1987 age composition, again shows that these apprehension trends are affected by structural ageing; in the former case the rate declines from 0.16 to 0.15 (per 100 males), while in the latter case it increases from 0.86 to 0.92. Decomposing the gap between the 1987 and 1997 crude ratios (0.70 percentage points), suggests that an underlying increase in apprehensions for this particular offence category in fact rose by 0.73 percentage points (105 per cent), while structural ageing contained this increase by 0.03 percentage points (5.0 per cent) (Figure 12.3.1.2). This is a similar trend to that identified for (male) offences against property, and offences against the person.

It is also similar to that for the period 1998-2004. When the 1998 ratio (0.41) is standardised to the 2004 age composition, it declines to 0.39, while the 2004 ratio (0.167) increases to 0.174 when it is standardised to the 1998 age composition. The crude gap in ratios between the beginning and end of the period (-0.24 percentage points) is caused by an underlying drop in apprehension levels which reduces it by 0.23 percentage points (95 per cent), and structural ageing reduces it by a further 0.01 percentage points (5.0 per cent).

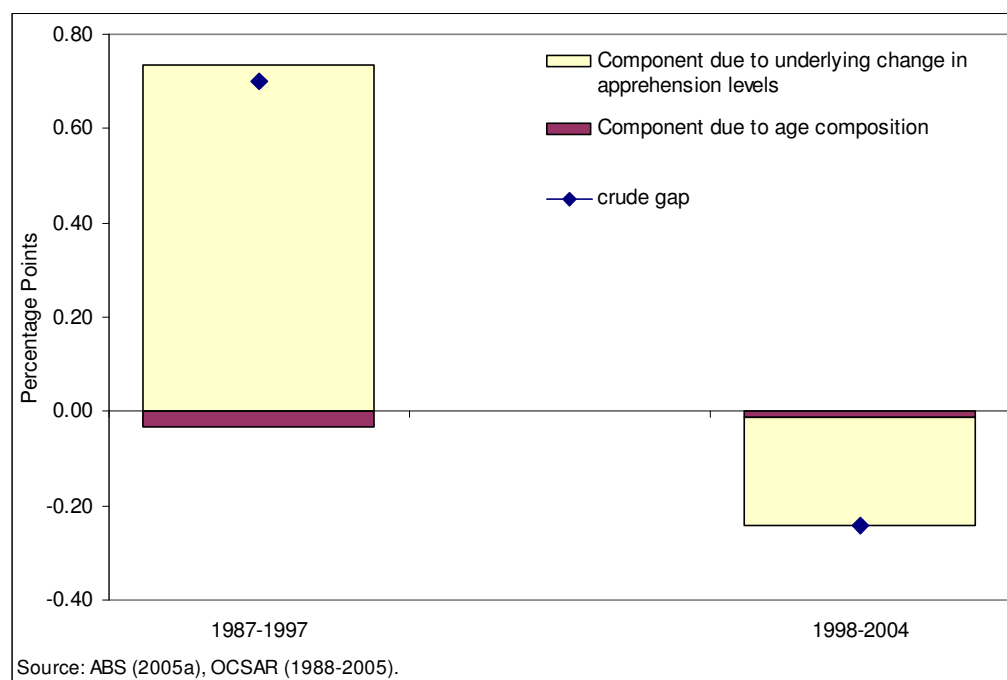


Figure 12.3.1.2: Male South Australian Apprehensions, Fraud and Misappropriation: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

12.3.2 Female Apprehension Trends

1987-1997: Observed apprehension numbers in relation to fraud and misappropriation increased considerably for females – by 369 per cent – across the period 1987-1997 (from 456 to 2,140), with a period of slight decline between 1987 and 1990 (Figure 12.3.2.1). Standardisation analysis shows that if the population had not aged structurally over this time, numbers would have been higher by 6.8 per cent (reaching 2,295 apprehensions by 1997, and thus peaking at the same time as for males, but later than for previous offence categories). The contribution of changing age structure is thus smaller for this offence category than those considered so far, suggesting underlying differences in the age distribution of offenders (and hence a variant age-crime pattern). By comparison, if the population had not grown in size, numbers in 1997 would have been lower by 6.4 per cent (2,044 apprehensions), while if apprehension levels had remained constant, numbers would have been lower than observed by 79 per cent (445 apprehensions). In each case, findings are similar to those for the previous offence categories; age- and size-standardised numbers unfold in the same manner as actual numbers (the former being higher, and the latter lower), while change in apprehension levels account for the majority of increase.

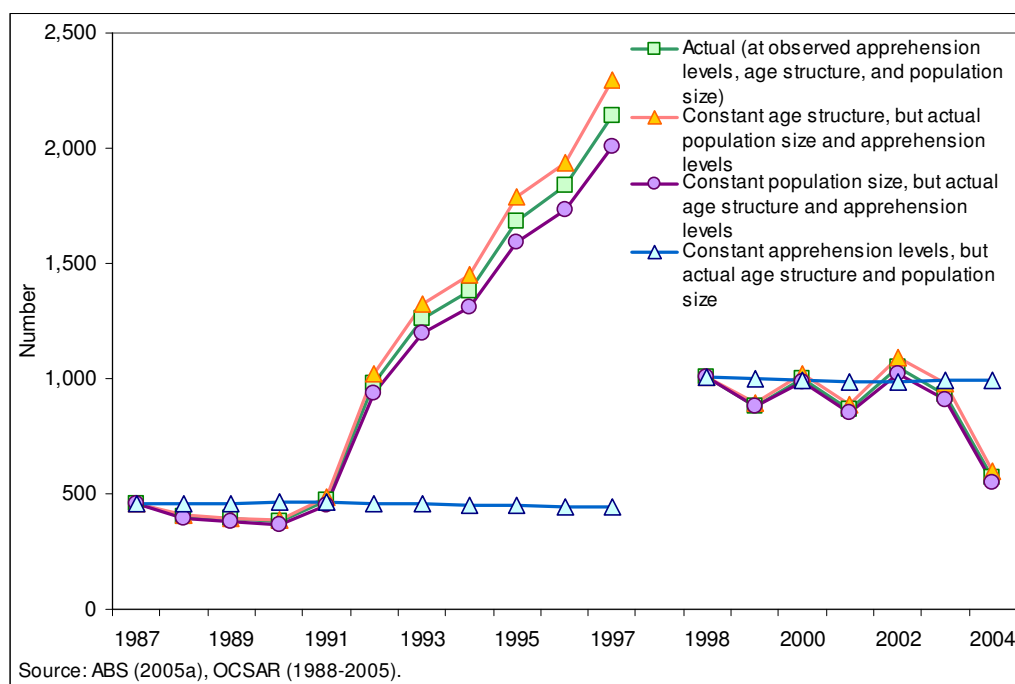


Figure 12.3.2.1: Female South Australian Apprehensions, Fraud and Misappropriation: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: Standardisation analysis again indicates that structural ageing and population growth made minor contributions to changing apprehension levels across the period 1998-2004. As indicated for males in relation to this offence category, actual numbers fell by around one-half of their 1997 level in 1998 because counting rules changed over these two years. Observed numbers also dropped from 1,004 to 568, an overall decline of 43 per cent, fluctuating between 1998 and 2002 and declining thereafter). Had the 1998 age composition remained constant, numbers would have been 5.4 per cent higher (600 apprehensions by 2004), while had the 1998 population size remained constant, numbers would have been 3.0 per cent lower (551 apprehensions by 2004). By contrast, a more sizeable contribution to changing apprehension numbers by change in apprehension levels *per se* is indicated (and the main source of fluctuation in numbers over the period); numbers in 2004 would have been higher than observed by 75 per cent (995 apprehensions).

Decomposition: The crude ratio for 1987 declines when standardised to the older 1997 age composition (from 0.083 to 0.076 apprehensions per 100 females), and the ratio for 1997 increases when standardised to the younger 1987 age composition

(from 0.37 to 0.39); hence, apprehension ratios for fraud and misappropriation are (as in all previous cases) raised by a younger age composition, and lowered by an older one. Decomposition suggests that the crude gap of 0.28 percentage points has been raised 0.30 percentage points (106 per cent) by underlying change in apprehension numbers (Figure 12.3.2.2). Structural ageing reduced it by only 0.02 percentage points (6.0 per cent). This pattern reflects those for (female) offences against the person (and male apprehension trends for fraud and misappropriation).

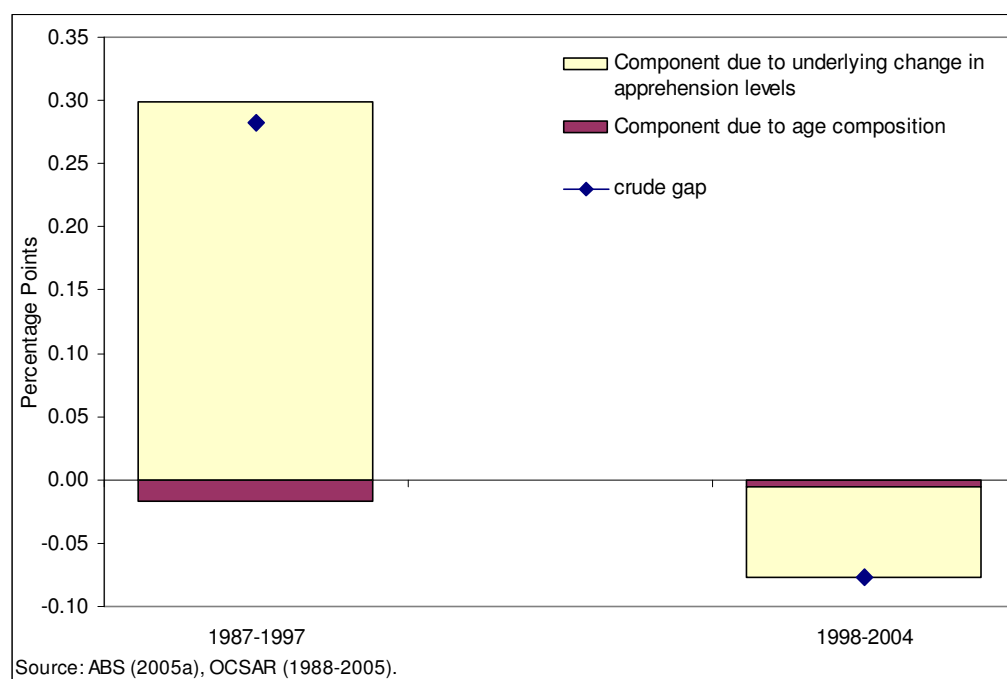


Figure 12.3.2.2: Female South Australian Apprehensions, Fraud and Misappropriation: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

When the 1998 ratio (0.17) is standardised to the 2004 age composition, it drops to 0.16, while the 2004 ratio (0.09) increases to 0.10 when it is standardised to the 1998 age composition. Decomposition indicates that both structural ageing and underlying change in apprehension numbers made negative contributions to the net gap, which declined by 0.08 percentage points. Changed age composition accounts for eight per cent of the reduction (0.01 percentage points), while an underlying change decline in apprehension levels accounted for the residual 92 per cent (0.07 percentage points). Again the contribution from changing age composition is relatively small, indicating

that age is less associated with fraud and misappropriation than with the two previous offence categories analysed (for both males and females).

12.4 Sexual Offences

This section considers the second smallest offence category in the standardisation analysis – sexual offences – which accounted for less than one-twentieth of all apprehensions in South Australia between 1987 and 2004 (as indicated in Chapter 7).

Due to the very low base of female apprehensions for this particular offence category, they are not included in the analysis.

12.4.1 Male Apprehension Trends

1987-1997: Figure 12.4.1.1 shows that across the period 1987-1997, the actual number of apprehensions grew, overall, by 56 per cent (from 354 to 551), first growing dramatically between 1989 and 1992, then subsequently declining. This fluctuation is not easily explained, with the South Australia Police annual reports for this period providing no insight into possible causes. Standardisation suggests a negligible effect from changed age composition; numbers in 1997 would have been higher by only 1.4 per cent (559 apprehensions) had the population not aged structurally over the period. A small effect is again indicated by population growth, but a greater effect from changed apprehension levels; numbers would have been 5.7 per cent lower (520 apprehensions by 1997) than observed if the 1987 population size had remained constant, while numbers would have been 34 per cent lower (362 apprehensions by 1997) if 1987 apprehension levels had remained constant.

Structural ageing, therefore, has scarcely constrained growth in apprehension numbers for (male) sexual offences, and thus neither clearly supports nor negates the age composition expression of the age structure-crime pattern. Size-standardised numbers again closely approximate the trajectory of observed numbers, and so does not account for their rise or peak in 1992 and subsequent decline. By comparison, the trend in observed numbers is largely the result of changed apprehension levels.

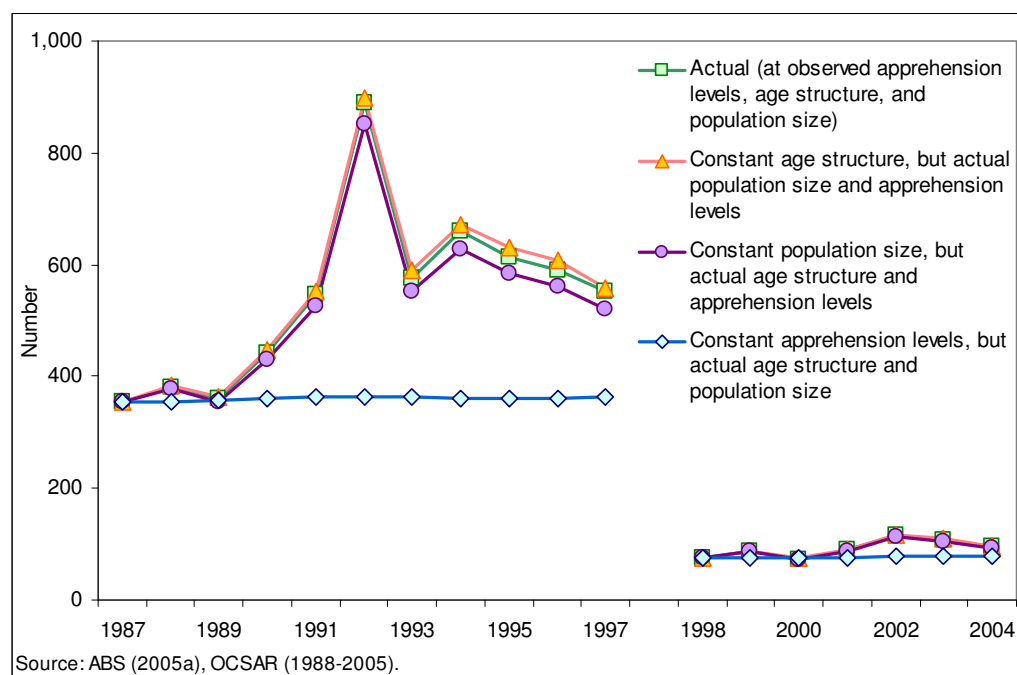


Figure 12.4.1.1: Male South Australian Apprehensions, Sexual Offences: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

1998-2004: There is a large drop in observed numbers from 1997 to 1998 as a result of the change in counting rules. Across the period 1998-2004, observed numbers rose by 25 per cent, from 76 to 97, growing between 2000 and 2002, but subsequently declining. Hence observed numbers peak in 2002 (which, it is of note, coincides with the peak in observed numbers for offences against the person), and may be due to an increased willingness of victims to report crimes of this nature (SAPOL 2002). Consistent with the previous period, change in age composition had no real effect on numbers in 2004, which would have been only 0.4 per cent lower (97 apprehensions), had the 1998 age composition remained constant, and a smaller effect than change in population size (4.0 per cent lower, with 93 apprehensions, at 1998 population size) and particularly change in apprehension levels (20 per cent lower, with 78 apprehensions, at 1998 levels).

Decomposition: Age-standardising the 1987 apprehension ratio (per 100 males) for sexual offences to the older 1997 age composition, and the 1997 apprehension ratio to the younger 1987 age composition, again shows that these apprehension trends are slightly influenced by change in age composition, the former declining from 0.065 to

0.063, and the latter increasing from 0.096 to 0.097. Figure 12.4.1.2 indicates that the net gap in the crude ratio between 1998 and 2004 (an increase of 0.031 percentage points) is a result of an underlying change in apprehension numbers increasing it by 106 per cent (0.032 percentage points), which has been reduced by structural ageing by six per cent (0.002 percentage points). This pattern approximates that of previous offence categories.

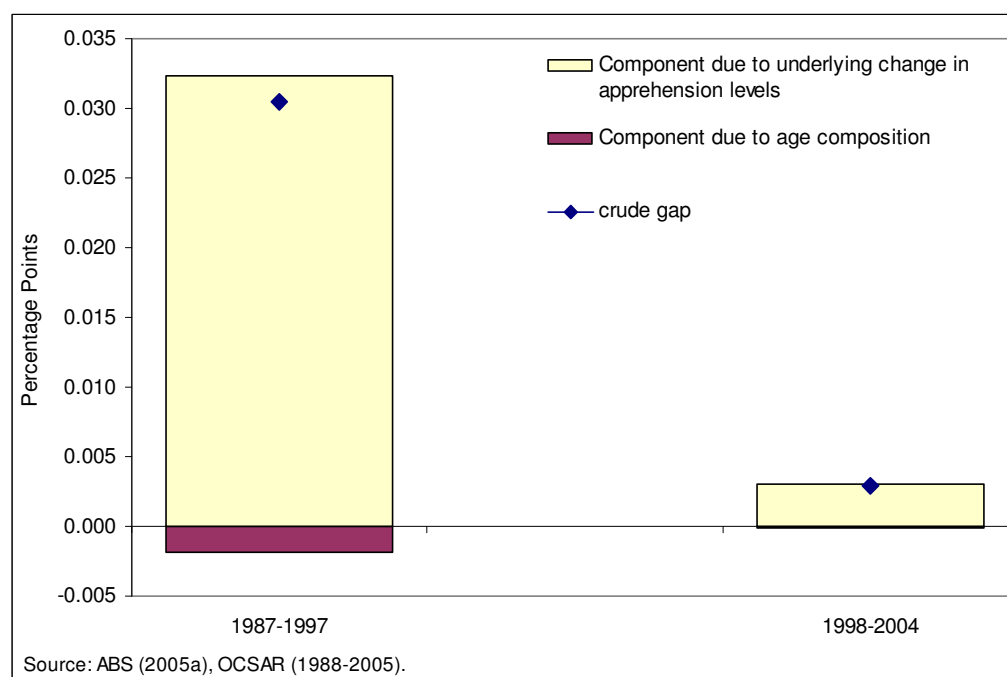


Figure 12.4.1.2: Male South Australian Apprehensions, Sexual Offences: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

Similarly, the 1998 ratio declines when standardised to the 2004 age composition (from 0.0131 to 0.0129), while the 2004 ratio increases when standardised to the 1998 age composition (from 0.0160 to 0.0161). Decomposition of the observed gap between the beginning and end of the period (0.003 percentage points), suggests that an underlying change in apprehension levels for sexual offences in fact increased by 0.003 percentage points (103 per cent), while age composition offset this by 0.0001 percentage points (three per cent). However, these influences are really too small to hold much validity.

12.5 Robbery and Extortion

This section focuses on robbery and extortion-related apprehensions in South Australia, between 1987 and 2004, which were seen in Chapter 7 to account for the least apprehensions in the region.

Incidentally, females (again) did not attract an adequate number of apprehensions over this period to conduct a reliable analysis.

12.5.1 Male Apprehension Trends

1987-1997: The observed number of apprehensions increased from 232 to 391 across the period 1987-1997 (by 69 per cent overall), with an accelerated period of growth between 1989 and 1993, and declining thereafter (Figure 12.5.1.1). Thus apprehension numbers for robbery and extortion peak in 1993 (at a different year to all other offence categories). Thomas, Mannik and Wunderwitz (1997) suggest that this increase is due to an increase in reporting levels of robbery and extortion offences in combination with discrepancies in how police define unarmed robbery (with many of these so-called offences actually relating to larceny, which in this analysis is categorised as an offence against property). Had the population not aged structurally over this time, numbers would have been somewhat higher, by 14 per cent (reaching 452 apprehensions in 1997). Conversely, had the population not grown in size, numbers in 1997 would have been lower by 5.7 per cent (369 apprehensions), while had apprehension levels not changed, numbers in 1997 would have been lower by 46 per cent (213 apprehensions). In each case these findings are similar to those for the first three offence categories analysed above; age- and size-standardised trends follow the same trends as actual numbers (the former above, and the latter below, actual numbers), while change in apprehension levels (indicated by holding these constant) accounts for most of the increase.

1998-2004: A change in counting rules from 1997 to 1998 appears to have caused a sizeable increase in numbers between these two years. Nonetheless, actual numbers fell by 38 per cent (from 514 to 320) across the period 1998-2004, declining dramatically between 2002 and 2004. This coincides with Operation Counteract IV,

introduced by South Australia Police to target armed robberies (SAPOL 2002), and may have contributed to this decline. Standardisation analysis shows a small effect from both age composition and population size; by 2004, had the 1998 age composition remained constant, numbers would have been 3.8 per cent higher (333 apprehensions), while if the 1998 population size had remained constant numbers would have been 4.0 per cent lower (307 apprehensions). Again, however, changing apprehension levels have had the greater impact, numbers in 2004 being 64 per cent higher (525 apprehensions) had 1998 apprehension levels remained constant.

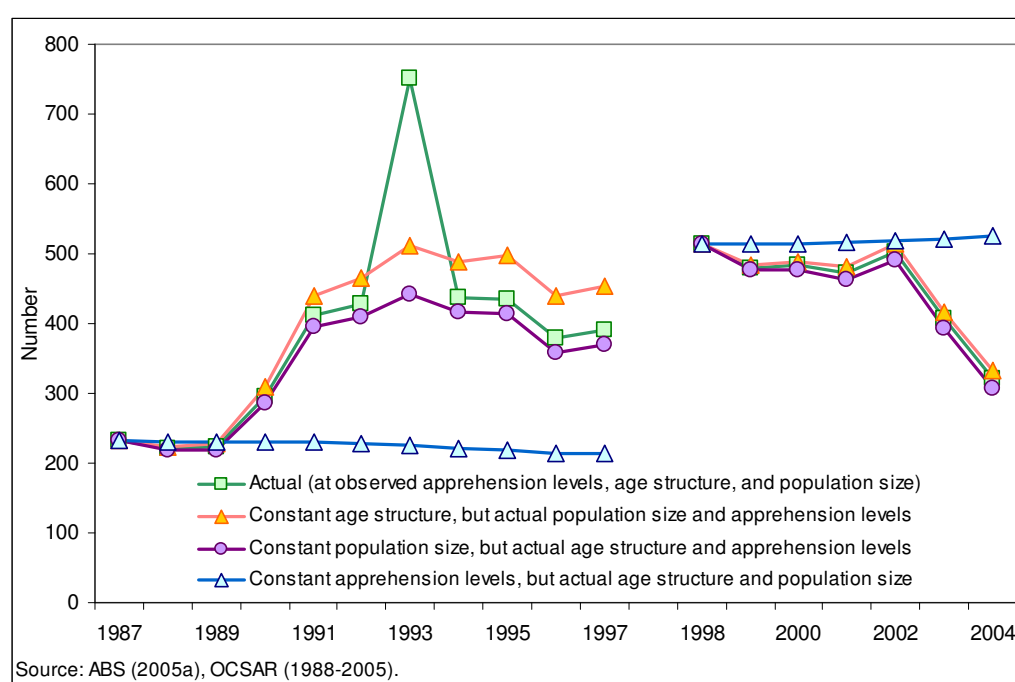


Figure 12.5.1.1: Male South Australian Apprehensions, Robbery and Extortion: Observed, Age-, Size- and Apprehension-Standardised Numbers, 1987-1997 and 1998-2004.

Decomposition: The crude ratio (per 100 males) for 1987 declines when standardised to the older 1997 age composition (from 0.43 to 0.37), and the ratio for 1997 increases when standardised to the younger 1987 age composition (from 0.07 to 0.08); hence, apprehension ratios for (male) robbery and extortion are forced up by a younger age composition, and forced down by an older one. Figure 12.5.1.2 suggests that the crude gap (0.025 percentage points) was raised by underlying change in apprehension numbers by 0.033 percentage points (133 per cent), while structural

ageing reduced it by 0.008 percentage points (or 33 per cent). This is a similar pattern to that observed for most offence categories.

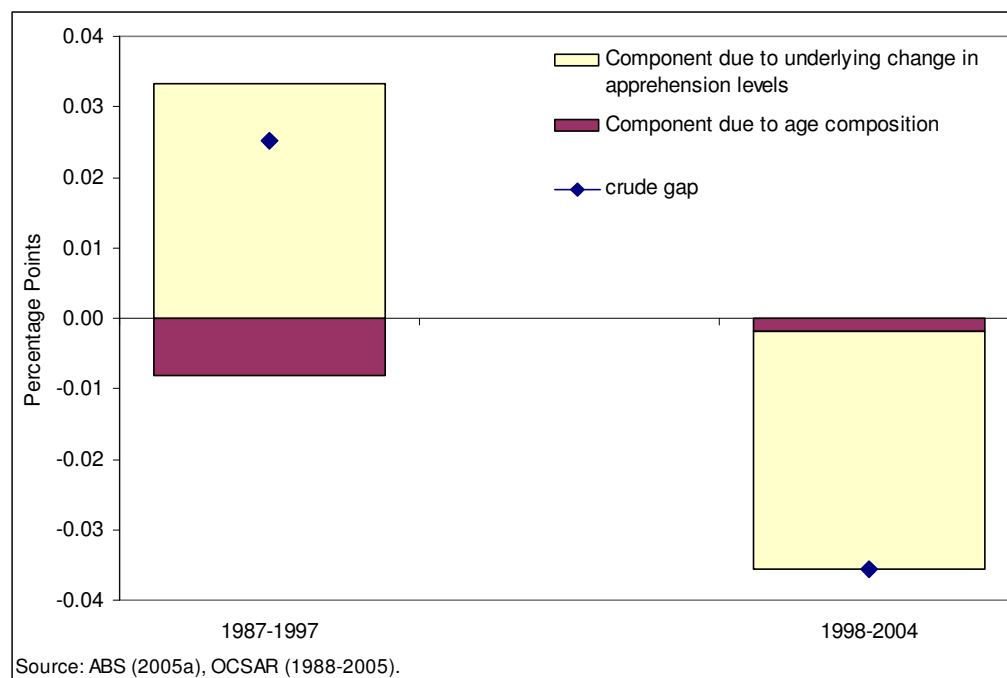


Figure 12.5.1.2: Male South Australian Apprehensions, Robbery and Extortion: Decomposed Ratios ('00), 1987-1997 and 1998-2004.

When the 1998 ratio (0.089) is standardised to the 2004 age composition, it falls to 0.087, while the 2004 ratio (0.053) increases to 0.055 when it is standardised to the 1998 age composition. Decomposition suggests that both structural ageing and underlying change in apprehension numbers made negative contributions to the observed gap (0.036 percentage points); the former accounts for 5.0 per cent of the decline (0.002 percentage points), and hence the latter for 95 per cent (0.034 percentage points).

12.6 Summary and Conclusions

The following observations can be made across the offence-specific analysis of the impact of comparative measures on South Australian apprehension trends across the periods 1987-1997 and 1998-2004, which are summarised in Table 12.6.1:

1. Observed numbers tend to increase and decline across the periods analysed, but do so differently by offence category and period, and to a lesser degree by gender. Furthermore, the timing of peaks in numbers differs by offence category, suggesting that the underlying cause of change in numbers (for example, police surveillance and reporting levels) differs by offence.
2. The change in counting rules between 1997 and 1998 caused the actual number for these two years to decline for two offence categories (fraud and misappropriation and sexual offences), and increase for another two (offences against property and particularly (male) robbery and extortion); with regard to offences against the person, a small decline is indicated for males, but an increase for females. This suggests that the spread of offences across individuals differs by offence category, and to a lesser degree by gender. For example, fraud and misappropriation offences are clearly concentrated across a small group of offenders (i.e. repeat offenders), whereas the ‘younger’ offences against property are more widely dispersed across a larger group of offenders.
3. From point 2, the change in counting rules has caused apprehension-standardised numbers to increase between the two periods for four offence categories (offences against property, offences against the person, fraud and misappropriation, and (male) robbery and extortion), but decline for (male) sexual offences.
4. In all cases, change in age composition (i.e. structural ageing) has a reducing effect on numbers; however, the effect is greatest for offences against property (and to a lesser degree offences against the person) and least for (male) sexual offences (where structural ageing has no real effect on numbers). The effect is also generally smaller during the period 1998-2004, which most likely relates to the rate of decline in young persons’ share of the population slowing.
5. However, the greatest contributor to both increase and decrease in numbers is change in apprehension levels *per se*.
6. In all cases, change in population size has an increasing effect on numbers. While the effect is generally smaller than that for age composition between

Table 12.6.1: Summary of Contribution (%) to Change in Retrospective Male and Female South Australian Apprehension Numbers, by Each Standardised Component and Period.

	1987-1997				1998-2004			
	Change (%)				Change (%)			
	From Actual 1987 Number	Difference from Actual 1997 Number due to Change in Age Composition	Difference from Actual 1997 Number due to Change in Population Size	Difference from Actual 1997 Number due to Change in Apprehension Rates	From Actual 1998 Number	Difference from Actual 2004 Number due to Change in Age Composition	Difference from Actual 2004 Number due to Change in Population Size	Difference from Actual 2004 Number due to Change in Apprehension Rates
Males								
Against Property	19.0	-13.0	5.7	23.0	-11.0	-3.6	4.0	-14.0
Against the Person	65.0	-8.5	5.7	42.0	-10.0	-3.9	4.0	-11.0
Fraud and Misappropriation	471.0	-6.1	5.7	83.0	-57.0	-4.3	4.0	-135.0
Sexual Offences	56.0	-1.4	5.7	34.0	25.0	0.4	4.0	20.0
Robbery and Extortion	69.0	-14.0	5.7	46.0	-38.0	-3.8	4.0	-64.0
Total Apprehensions (Male)	57.0	-10.0	5.7	41.0	-16.0	-3.8	4.0	-20.0
Females								
Against Property	-5.9	-11.0	6.4	-4.0	-18.0	-3.7	3.0	-22.0
Against the Person	137.0	-10.4	6.4	60.0	-18.0	-3.6	3.0	-21.0
Fraud and Misappropriation	369.0	-6.8	6.4	79.0	-43.0	-5.4	3.0	-75.0
Sexual Offences	...	...	...	...	...	...	...	...
Robbery and Extortion	...	...	...	...	...	...	...	...
Total Apprehensions (Female)	50.0	-9.3	6.4	35.0	-21.0	-3.9	3.0	-29.0

Source: ABS (2005a), OCSAR (1988-2005).

1987 and 1997, the two types of change generally had a similar level of effect across the latter period.

7. Decomposition confirms the reducing effect of changing age composition, but also that its impact has been less than that of underlying change in apprehension numbers.

In conclusion, the findings across the analysis support the age composition expression of the age structure-crime pattern (or the atypical expression of the Easterlin hypothesis (1987a)), although the effect of change in age composition has not been as great as that of change in apprehension levels and not always greater than that of change in population size. Furthermore, there is some variance in the effect of change in age composition across offence categories (thus suggesting some variance in the underlying age distribution of offenders), being most influential for offence categories with a 'younger' age distribution of offenders and least influential for those with an 'older' age distribution of offenders. This finding concurs with the proposition put forward in Chapter 3. The next two chapters continue the investigation of the age composition expression of the age structure-crime pattern, but will turn to projected change for the period 2004-2051. This aspect of the comparative analyses considers the association for Western Australia as well as South Australia for the purpose of comparing the influence of structural ageing across regions.

Chapter Thirteen – Projected Compositional Effects for South Australia and Western Australia 2004-2051: Total Apprehensions

This chapter continues the investigation of the age composition expression, but examines projected male and female apprehension levels in both South Australia and Western Australia, for the period 2004-2051. Comparative techniques (what I refer to as ‘simple decomposition’ in this instance) are again used in the analysis, but for the purpose of determining the prospective impact of changes in population size and age composition on offence trends (explained in Chapter 5). The analyses for South Australia again utilise apprehension data from *Crime and Justice in South Australia* (OCSAR 2005), while the Western Australian analyses utilise *Crime and Justice Statistics for Western Australia* (CRC 2005). Population data, however, are from *Population Projections, Australia, 2004-2102* (ABS 2005b) (see Chapter 6).

With the total apprehension ratio of the respective region held constant at its 2004 level against projected total population numbers, crude projected apprehension numbers are solely due to change in population size. These crude projections are subsequently compared to age-weighted projections. Age-weighted projections incorporate both changing population size and changing age composition. Thus the difference between them is the effect of changing age composition (both projections account for change in size, but only age composition occurs in age-weighting). The age-weighted projections are then compared to size-standardised projections. Size-standardised projections hold the 2004 population size constant, but allow the population to age structurally as projected. The difference between the age-weighted and size-standardised projections thus indicates the effect of no change in population size (both projections account for change in age composition, but only size occurs in age-weighting).

13.1 South Australian Apprehension Trends

This section projects South Australian apprehension levels, by gender, for the period 2004-2051, according to 2004 apprehension rates and projected change in population size and age composition.

13.1.1 Male Apprehension Trends (SA)

There were 18,108 apprehensions in 2004. If the 2004 crude apprehension ratio (3.0 apprehensions per 100 males aged 14-80 years) remained constant across the period 2004-2051, and the population grows as projected, there would be minimal change in numbers, with around 18,190 apprehensions by 2051 (an increase of only 0.5 per cent) (Figure 13.1.1.1). However, numbers could be expected to rise slightly between 2004 and 2025 to 19,675 apprehensions (by 8.7 per cent) – coinciding with the peak projected size of the population (656,048 South Australian males aged 14-80 years) – and to subsequently decline.

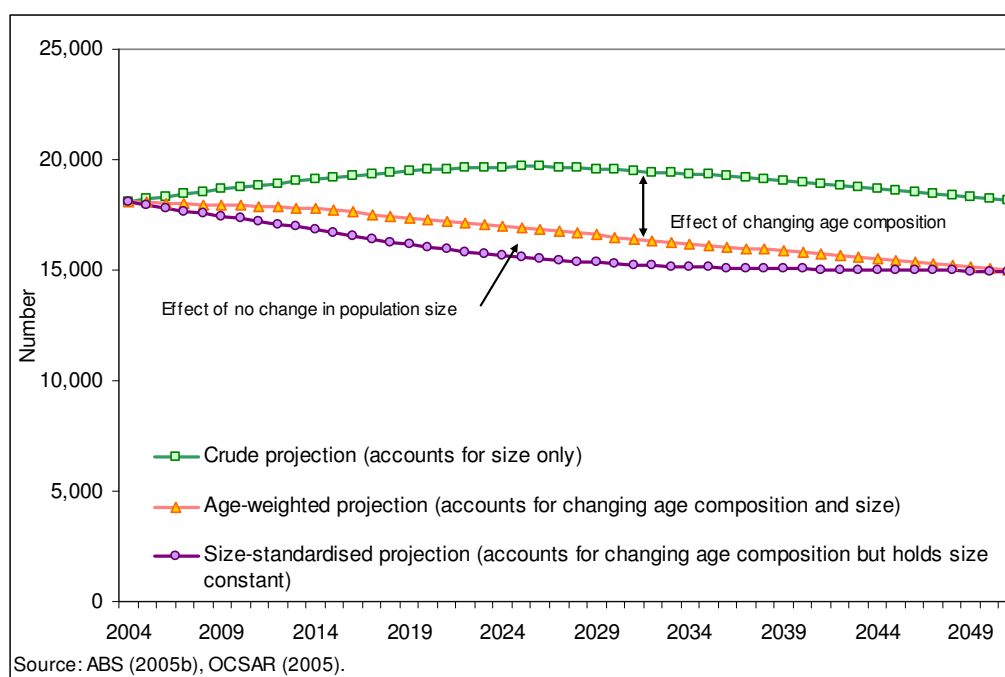


Figure 13.1.1.1: Projected Male South Apprehensions (at 2004 rates): Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

Age-weighted numbers indicate that if 2004 age-specific apprehension ratios remained constant, but the population ages and grows as projected, numbers in 2051 would be lower than in 2004, declining steadily to 14,996 apprehensions by 2051. That is, there would be 3,194 fewer apprehensions than indicated by the crude projection at that time, a reduction of 18 per cent.

By comparison, if 2004 age-specific apprehension ratios and population size (around 604,000 males) remained constant, but the population ages as projected, numbers would be a little lower again across the period, with 14,929 apprehensions by 2051, having declined steadily through to 2034 and subsequently levelling off. That is, in 2051 there would be 67 fewer apprehensions than suggested by the age-weighted projection, a difference of only 0.5 per cent.

Thus structural ageing can clearly be expected to reduce apprehension numbers for South Australian males between 2004 and 2051, and the impact increases over time, both of which support the atypical expression of the Easterlin hypothesis (1987a). On the other hand, changing population size is likely to have little impact on numbers across the period and negligible impact by 2051. Therefore, structural ageing will, overall, account for most of the change in apprehension numbers across the period, and this change will potentially be one of decline. This is a substantially different picture to that indicated by the crude projection, which is the impression that someone using a non-age-weighted projection would get.

13.1.2 Female Apprehension Trends (SA)

From Figure 13.1.2.1, South Australian females were apprehended 4,673 times in 2004. There would be little change in this number if the 2004 crude apprehension ratio (0.77 apprehensions per 100 females aged 14-80 years) remained constant and population size changes as projected, with 4,559 apprehensions by 2051 (a small decline of 2.4 per cent). However, numbers could be expected to first rise to 5,030 apprehensions in 2025 (by 7.6 per cent) – concurrent with the peak projected size of the female South Australian 14-80 year old population (654,072 females in 2025) – and to decline thereafter.

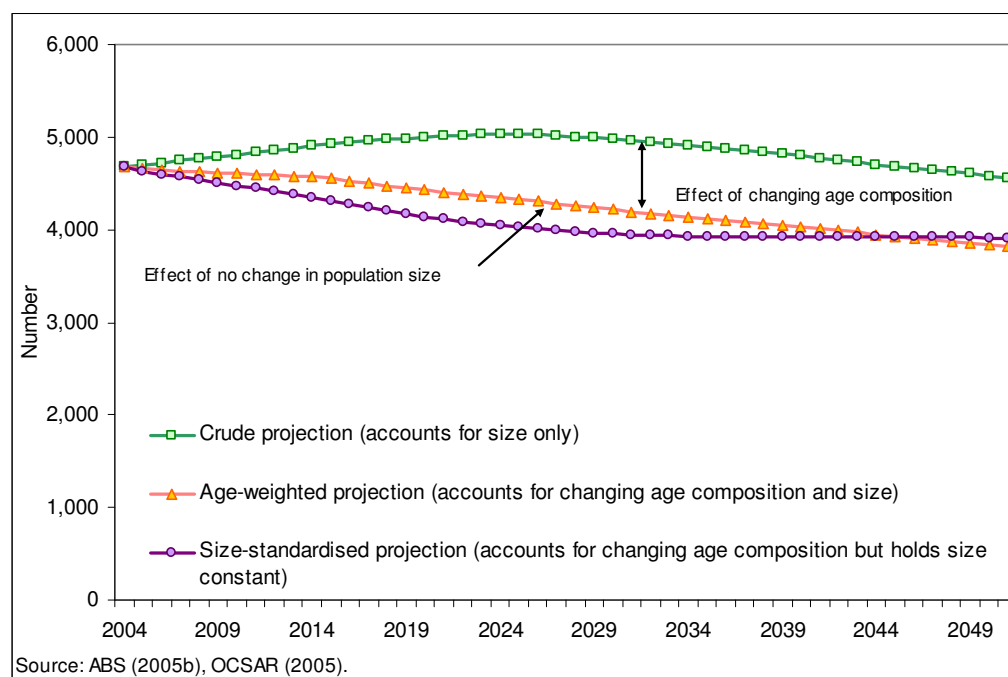


Figure 13.1.2.1: Projected Female South Australian Apprehensions (at 2004 rates): Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

Alternatively, if 2004 age-specific ratios remained constant, and age composition and population size change as projected, apprehension numbers would decline steadily, falling to 3,817 apprehensions by 2051, or 18 per cent (742) fewer apprehensions than suggested by the crude projection at that time.

Size-standardised numbers (at 2004 age-specific ratios and population size – around 608,000 females – with projected age composition) are slightly lower again than age-weighted numbers, although by 2051, there would be an additional 95 apprehensions (a difference of 2.4 per cent).

These findings again indicate that structural ageing will have a sizeable negative influence on female apprehension levels between 2004 and 2051, and this influence will increase across the period, supporting the age composition expression of the age structure-crime pattern (as for South Australian males). The difference between the age-weighted and size-standardised projections suggests that changing population size will have a somewhat smaller influence on future apprehension numbers (as also seen for equivalent males).

13.2 Western Australian Apprehension Trends

This section replicates the above analyses, but in relation to apprehension numbers for Western Australian males and females between 2004 and 2051.

13.2.1 Male Apprehension Trends (WA)

When the 2004 crude ratio (1.2 apprehensions per 100 males aged 14-80 years) for Western Australian males is held constant against projected population size over the period 2004-2051, apprehension numbers are seen to increase dramatically, from 9,125 to around 14,338 (by 58 per cent) (Figure 13.2.1.1).

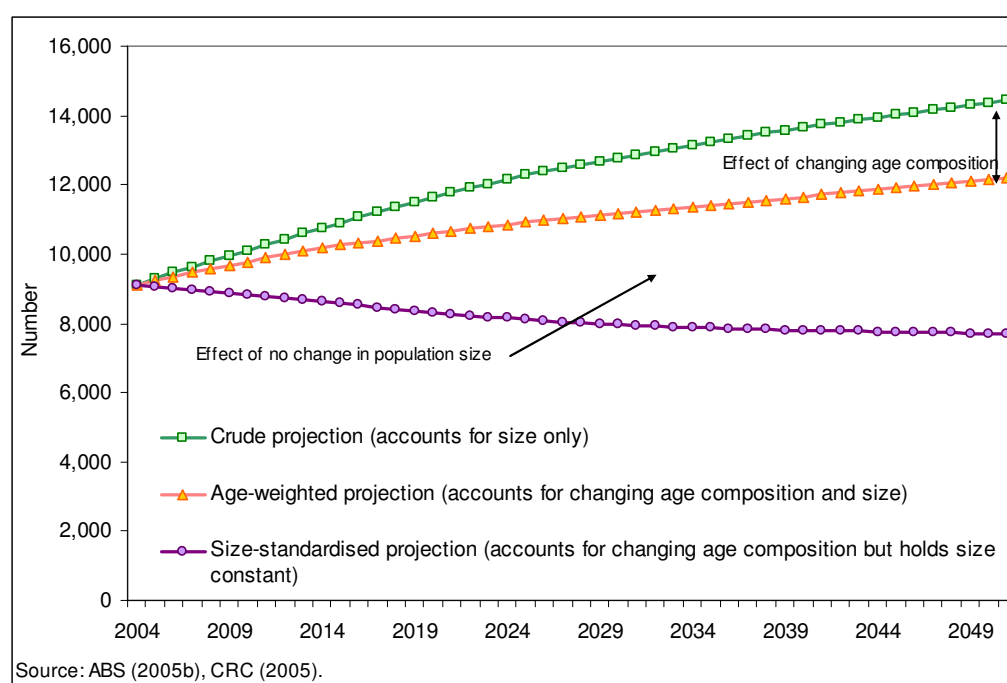


Figure 13.2.1.1: Projected Male Western Australian Apprehensions (at 2004 rates): Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

By contrast, while numbers would also grow should age composition and population size change as projected, and 2004 age-specific ratios remained constant, they could be expected to be lower than the crude projection; by 2051, there would be 2,161 fewer apprehensions (a reduction of 16 per cent), with numbers increasing steadily to only 12,177 apprehensions.

Numbers would be somewhat lower again across the period, and below the number observed in 2004, if 2004 age-specific apprehension ratios and population size (around 783,900 males) remained constant, but the population ages as projected. By 2051, only 7,696 apprehensions could be expected, or 4,481 less than the age-weighted projection indicates at this time (a difference of 58 per cent), with an accelerated period of decline through to around 2025.

Age-weighted findings for Western Australian males are therefore similar to those for male and female South Australians, with structural ageing having a negative impact on crude projected apprehension numbers, but with age composition effects containing growth rather than reducing numbers *per se*. Conversely, in this case, increasing population size would account for most of the change.

13.2.2 Female Apprehension Trends (WA)

Apprehension numbers for Western Australian females could also be expected to grow dramatically between 2004 and 2051, from 2,058 to 3,198 (by 55 per cent), if the 2004 crude apprehension ratio (0.27 apprehensions per 100 females aged 14-80 years) remained constant and the population grows as projected (Figure 13.2.2.1).

Age-weighted numbers suggest that while apprehension levels would also grow if 2004 age-specific apprehension ratios remained constant, but both age composition and population size changed as projected, numbers in 2051 would be 17 per cent (or 529 apprehensions) lower than the crude projection, increasing steadily to 2,669 apprehensions.

By comparison, size-standardised numbers are much lower than the age-weighted projection between 2004 and 2051 (with an accelerated period of decline through to around 2025), and fall below the actual 2004 number. With 2004 age-specific apprehension ratios and population size (around 774,300 females) held constant, but allowing for changing age composition, there would be 951 fewer apprehensions by 2051 than with the age-weighted projection (a difference of 55 per cent), with 1,718 apprehensions at this time.

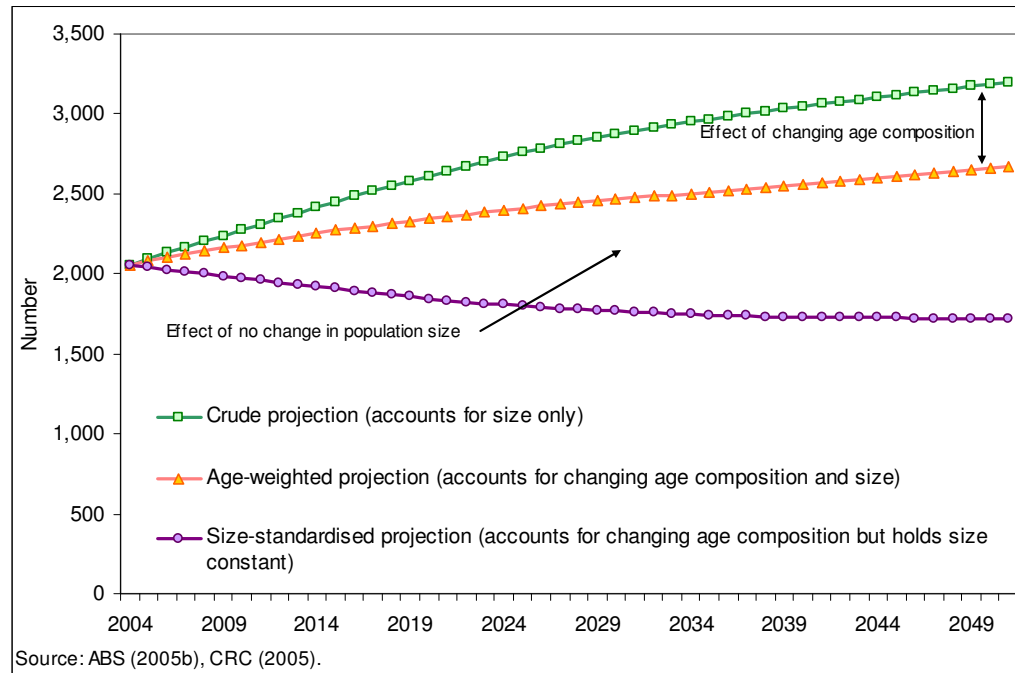


Figure 13.2.2.1: Projected Female Western Australian Apprehensions (at 2004 rates): Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

Again, therefore, structural ageing can be expected to have a sizeable negative (containing) impact on apprehension numbers. However, as suggested for Western Australian males, increasing population size would account for the majority of change.

13.3 Summary and Conclusions

Two general trends emerge from the prospective aggregate analyses of male and female South Australian and Western Australian apprehension numbers between 2004 and 2051:

1. Structural ageing can be expected to have a sizeable negative impact on apprehension levels. Thus, the age composition expression of the age structure-crime pattern (and the atypical expression of the Easterlin hypothesis) is supported.
2. Population size is likely to positively influence apprehension levels.

While the level of impact of structural ageing on apprehension trends is similar across the two regions (as indicated by the age-weighted projections), the impact of changing population size differs:

1. Population size can be expected to have only a small influence on apprehension levels for South Australian males and females, and almost no influence by 2051 under the underlying projection assumptions. Thus, age composition effects would reduce apprehension numbers.
2. Population size would be much more influential in relation to apprehension levels for Western Australian males and females, causing numbers to rise across the period. Hence, age composition effects would be expected to contain growth in apprehension numbers, rather than reduce them *per se*.

The next chapter continues the investigation of the prospective impact of compositional effects between 2004 and 2051, but focuses on offence-specific apprehension trends. Also, having established that age composition effects could be expected to have a similar influence on future South Australian and Western Australian apprehension levels (with underlying variance in changing population size accounting for differences across the two regions), the age composition expression is investigated primarily in relation to the former state.

Chapter Fourteen – Projected Compositional Effects for South Australia 2004-2051: By Offence Category

Continuing on from Chapter 13, this chapter focuses on anticipated age composition effects in relation to projected offence-specific apprehension trends, comparing crude apprehension numbers to age-weighted and size-standardised numbers. The five offence categories examined are: offences against the person, offences against property, fraud and misappropriation, sexual offences, and robbery and extortion. The analytical technique and data sources are the same as those applied in Chapter 13. The chapter presents results in graphical form for South Australia only. The results for Western Australia follow such a similar pattern that it was decided to present the data in tabular form, at the end of the chapter.

14.1 Offences Against Property

This section projects apprehension levels in relation to offences against property for the period 2004-2051. Chapter 7 indicated that this was the largest of the five offence categories in 2004, accounting for more than one-half of all apprehensions in South Australia at that time.

14.1.1 Male Population

Figure 14.1.1.1 shows three series of projected apprehension numbers for South Australian males with regard to offences against property, across the period 2004-2051. First, crude projections hold the 2004 total apprehension ratio (per 100 of the population) constant, but allow projected total population size to unfold. Second, age-weighted projections hold the 2004 age-specific apprehension ratios constant, but allow projected change in age composition and population size to unfold. Third, size-standardised projections hold the 2004 age-specific apprehension ratios and population size constant, but allow projected age composition to unfold.

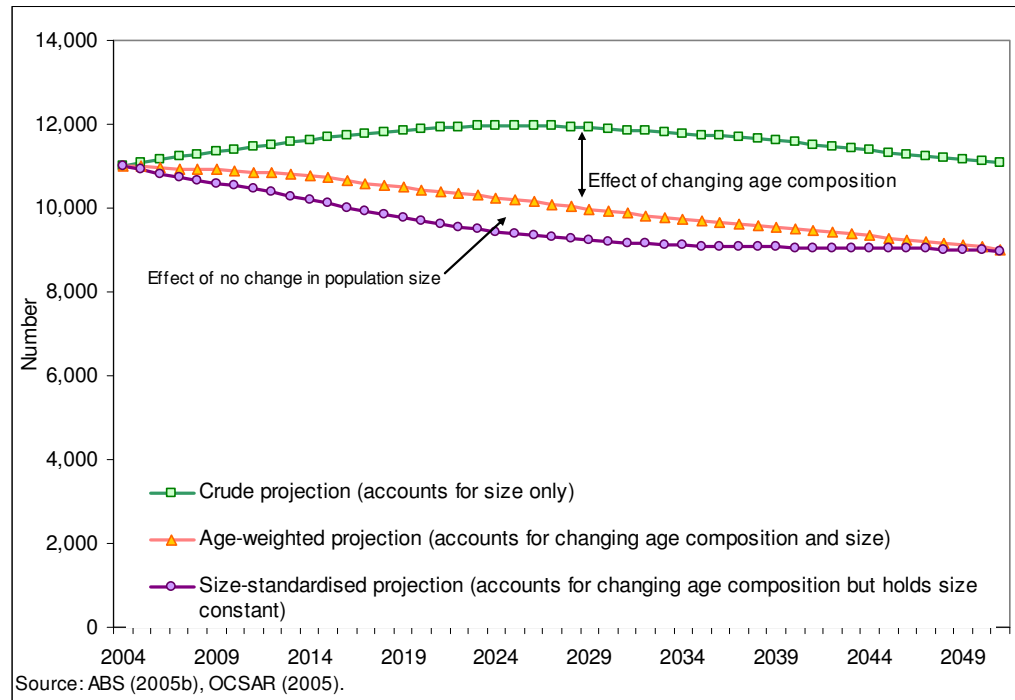


Figure 14.1.1.1: Projected Male South Australian Apprehensions (at 2004 rates), Offences Against Property: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

The crude projection shows that if the 2004 total apprehension ratio were to remain constant across the period, but projected total population size occur, apprehension numbers for offences against property would first slowly increase, peaking at 11,970 apprehensions in 2025, then decline. In 2051 they would be only 0.5 per cent higher than in 2004 (increasing from 11,017 to 11,067 apprehensions). Conversely, should 2004 age-specific apprehension ratios remain constant, but age composition and population size change as projected, numbers in 2051 would be lower than the crude projection by 19 per cent, or 2,050 apprehensions (declining to 9,017 apprehensions). Alternatively, if there was no change in population size across the period, changing age composition would result in lower numbers again, reducing the age-weighted projection by 0.5 per cent, or 41 apprehensions, by 2051 (declining to 8,976 apprehensions), but with an accelerated period of decline through to 2034.

Structural ageing thus clearly has the potential to substantially reduce apprehension numbers for (male) offences against property, and the impact increases over time, both of which strongly support Easterlin's (1987a) arguments concerning the association between age composition and crime. If the population doesn't grow as

much as projected, numbers will be even lower (or if it were to grow more than projected, numbers would be a little higher).

14.1.2 Female Population

Trends for the female population are very similar, but at lower levels (Figure 14.1.2.1). Crude projections (at the 2004 total apprehension ratio) similarly indicate an initial rise in apprehensions to 2025, followed by a small drop, numbers declining overall from 3,040 to 2,966 apprehensions (by 2.4 per cent). By comparison, assuming the population ages structurally and grows as projected (the age-weighted projection), numbers will be lower in 2051 by 16 per cent (474 apprehensions). Alternatively, if the population ages structurally but does not grow (the size-standardised projection) numbers will be *higher* than the age-weighted projection by 2.4 per cent (62 apprehensions).

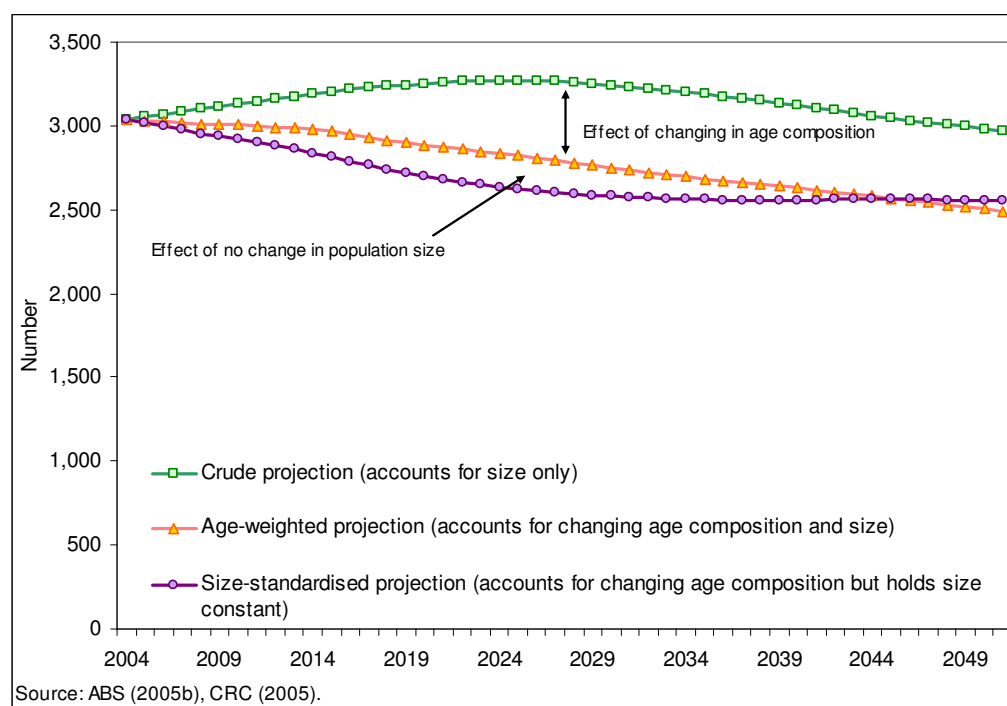


Figure 14.1.2.1: Projected Female South Australian Apprehensions (at 2004 rates), Offences Against Property: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

Hence, as for males, structural ageing will reduce apprehension numbers for offences against property, and the impact also increases over time, again supporting the age

composition expression of the age structure-crime pattern. However, in this case, while numbers would also be even lower should the population grow less than projected earlier in the period, by 2051, they would be a little higher.

14.2 Offences Against the Person

Offences against the person are the focus of this section, which Chapter 7 indicated to account for around one-quarter of all apprehensions in South Australia in 2004, making it the second largest of the five offence categories.

14.2.1 Male Population

Male apprehension numbers in relation to offences against the person similarly show minimal change if the 2004 total apprehension ratio remained constant and with projected population size, increasing overall by 0.5 per cent. Numbers would first rise through to 2025 but decline thereafter, from 5,143 apprehensions in 2004 to 5,166 apprehensions in 2051 (Figure 14.2.1.1). By contrast, age-weighting analysis shows that if age composition also changes as projected, numbers in 2051 would fall below this crude projection by 17 per cent, or 901 apprehensions (declining to 4,265 apprehensions). Conversely, size-standardisation indicates that if the 2004 population size remained constant numbers would be lower again, changing age composition lowering the age-weighted projection by 0.5 per cent, or 19 apprehensions, but with an accelerated period of decline through to 2034. In each case these findings are similar to those for (male) offences against property, with structural ageing reducing numbers (which will be lower again if the population does not grow as much as expected).

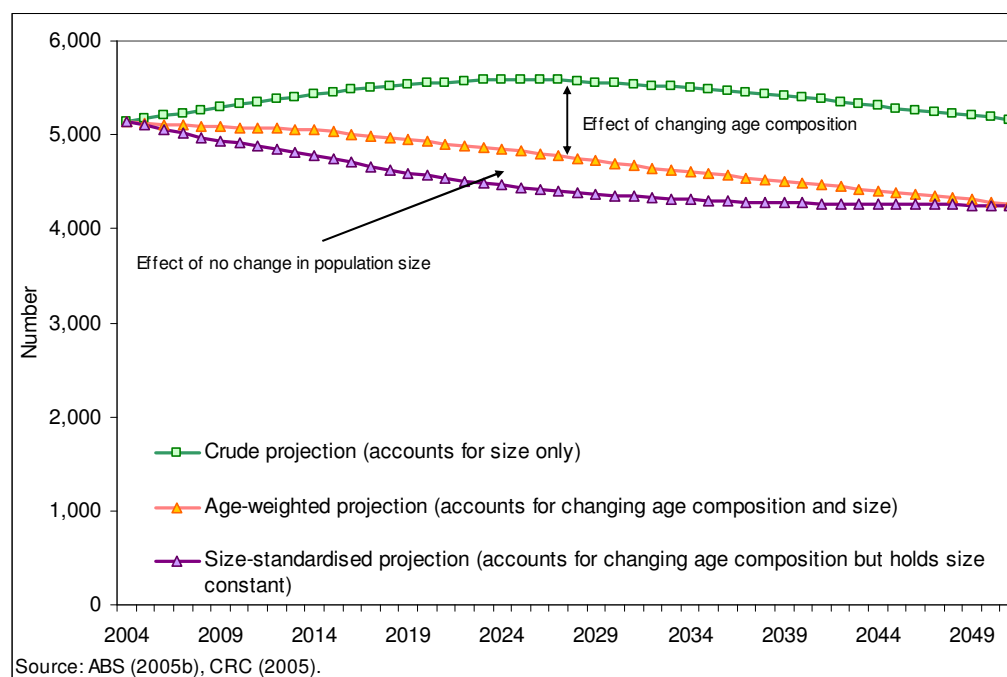


Figure 14.2.1.1: Projected Male South Australian Apprehensions (at 2004 rates), Offences Against the Person: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.2.2 Female Population

From Figure 14.2.2.1, trends for South Australian females are very similar to males, albeit at lower levels. Crude projections (at 2004 apprehension ratios) suggest that numbers would decline overall by 2.4 per cent, from 1,016 to 991 apprehensions. By comparison, projected change in age composition and population size has the potential to reduce the crude projection in 2051 by 17 per cent (169 apprehensions). Alternatively, if the 2004 population size remains constant, numbers will be higher than the age-weighted projection at this time by 2.4 per cent (21 apprehensions). Thus, as for males, structural ageing will reduce apprehension numbers for offences against the person.

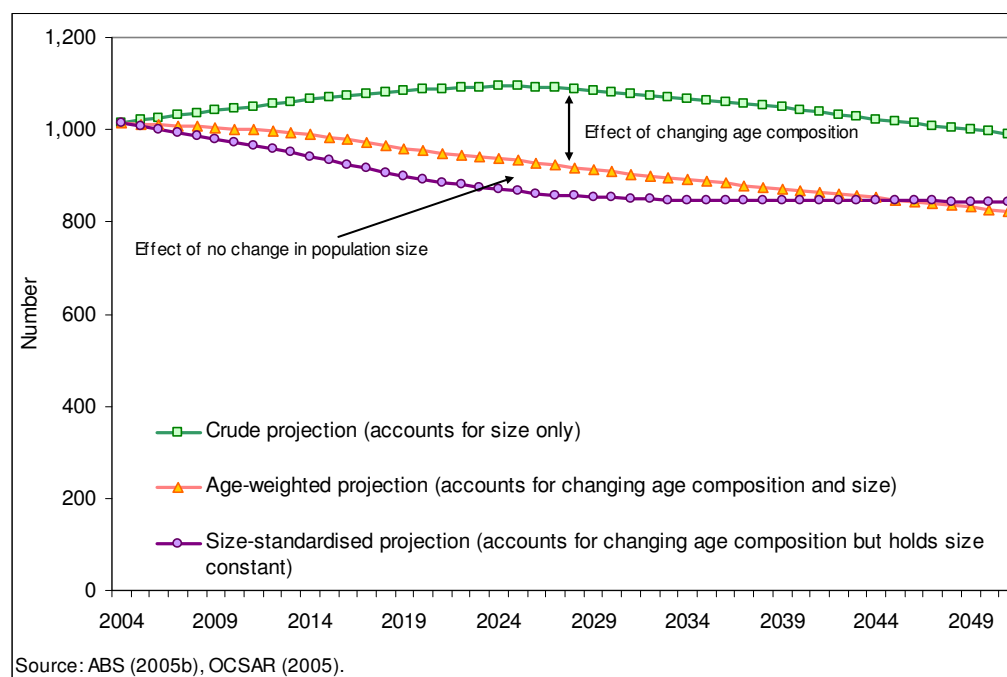


Figure 14.2.2.1: Projected Female South Australian Apprehensions (at 2004 rates), Offences Against the Person: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.3 Fraud and Misappropriation

The third largest offence category in South Australia in 2004, fraud and misappropriation, is analysed in this section. It accounted for almost one-tenth of all apprehensions in the region at this time (see Chapter 7).

14.3.1 Male Population

The crude projection (at 2004 total apprehension ratios, and projected population size) suggests that male apprehension numbers for this offence category would first slowly increase through to 2025, then decline, being only 0.5 per cent higher by 2051 (increasing from 1,007 to 1,012 apprehensions) (Figure 14.3.1.1). Conversely, assuming that the population ages structurally and grows as projected (the age-weighted projection), numbers in 2051 would be lower than the crude projection by 16 per cent, or 166 apprehensions (declining to 846 apprehensions); there would be only 0.5 per cent, or four, fewer apprehensions should 2004 population size remain constant, but with an accelerated period of decline through to 2034. Each of these

analyses reflects the findings for the two previous offence categories, and most importantly, changing age composition has the potential to reduce apprehension numbers.

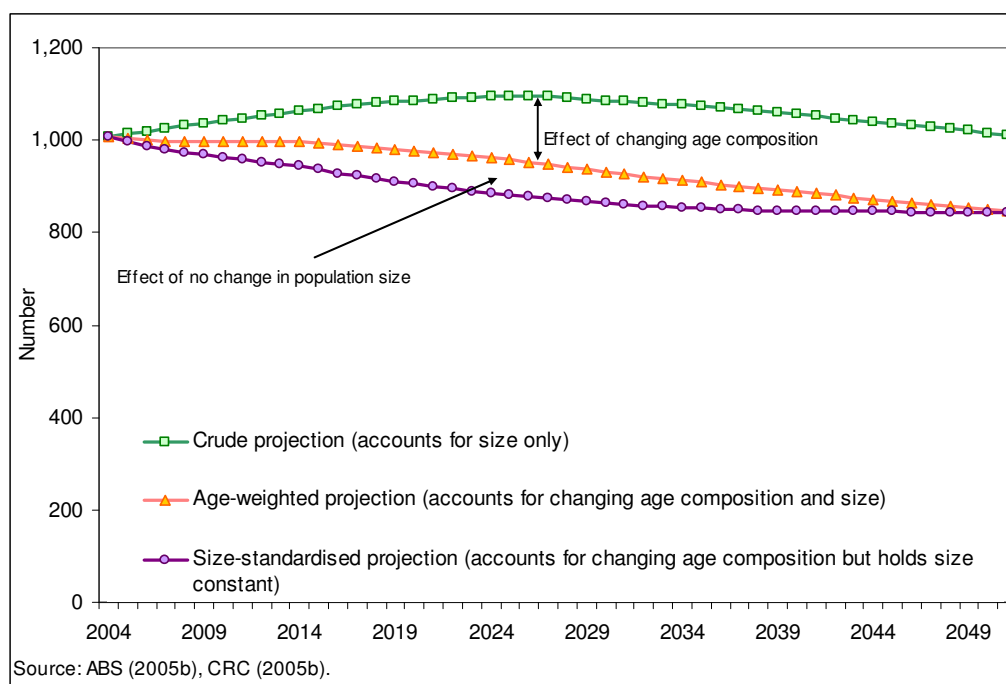


Figure 14.3.1.1: Projected Male South Australian Apprehensions (at 2004 rates), Fraud and Misappropriation: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.3.2 Female Population

Again trends for the female population are very similar to males, but at lower levels (Figure 14.3.2.1). Overall, the crude projection indicates that, should 2004 total apprehension ratios remain constant and the population grow as projected, apprehension numbers would fall by 2.4 per cent, declining overall from 568 apprehensions in 2004 to 554 apprehensions in 2051. By contrast, age-weighting analysis suggests that structural ageing has the potential to reduce the crude projection in 2051 by 16 per cent (91 apprehensions), while size-standardisation suggests that numbers will be a little higher than this, by 2.4 per cent (12 apprehensions), should there be no change in population size. Therefore, as for males, changing age composition could be expected to have a negative impact on apprehension numbers for fraud and misappropriation.

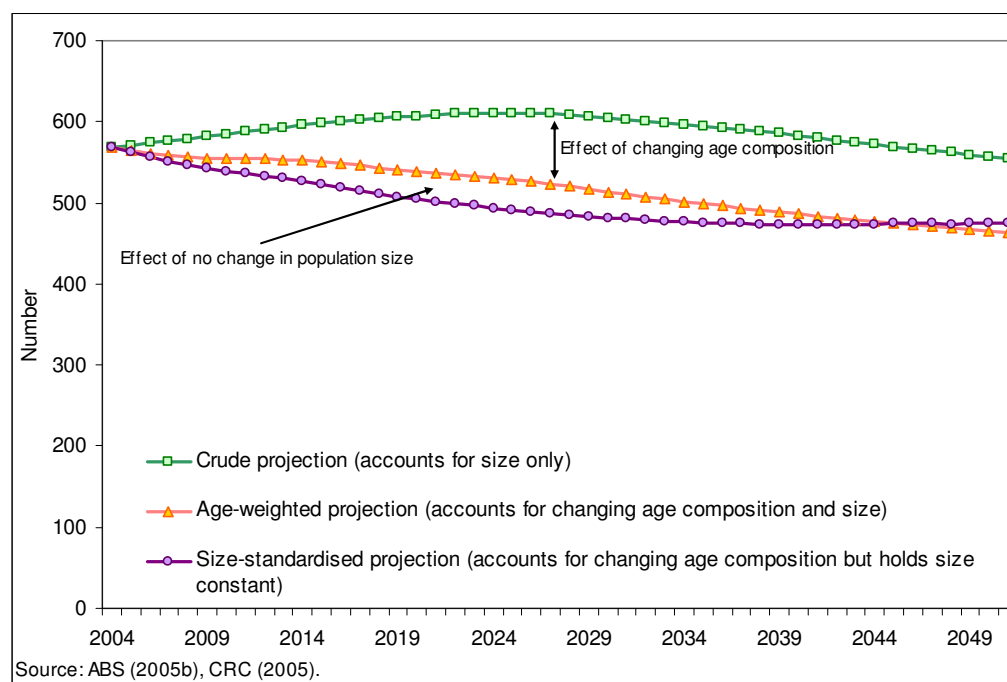


Figure 14.3.2.1: Projected Female South Australian Apprehensions (at 2004 rates), Fraud and Misappropriation: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.4 Sexual Offences

Apprehensions in relation to sexual offences are discussed here. This is a very small offence category, accounting for less than five per cent of all South Australian apprehensions in 2004 (see Chapter 7).

Data are presented for South Australian males only, as the number of apprehensions for females in 2004 was insufficient to conduct a reliable analysis.

14.4.1 Male Population

From Figure 14.4.1.1, the crude projection for male apprehensions in relation to sexual offences shows numbers to initially increase, peaking at 105 apprehensions in 2025, and decline thereafter, if the 2004 total apprehension ratio were to remain constant, but projected total population size occur. By 2051, numbers would return to the 2004 observed number (97 apprehensions) in 2051 – an overall increase of 0.5 per cent. By comparison, should 2004 age-specific apprehension ratios remain constant, but age composition and population size change as projected, numbers in

2051 will be lower than the crude projection by 5.8 per cent, or five apprehensions (falling to 92 apprehensions). Alternatively, if there is no change in population size, changing age composition would result in there being one less apprehension than indicated by the age-weighted projection, a difference of 0.5 per cent, but with an accelerated period of decline through to 2034. In each case these findings are similar to those for the previous (male) offence categories analysed, with structural ageing reducing numbers, but at a lower level.

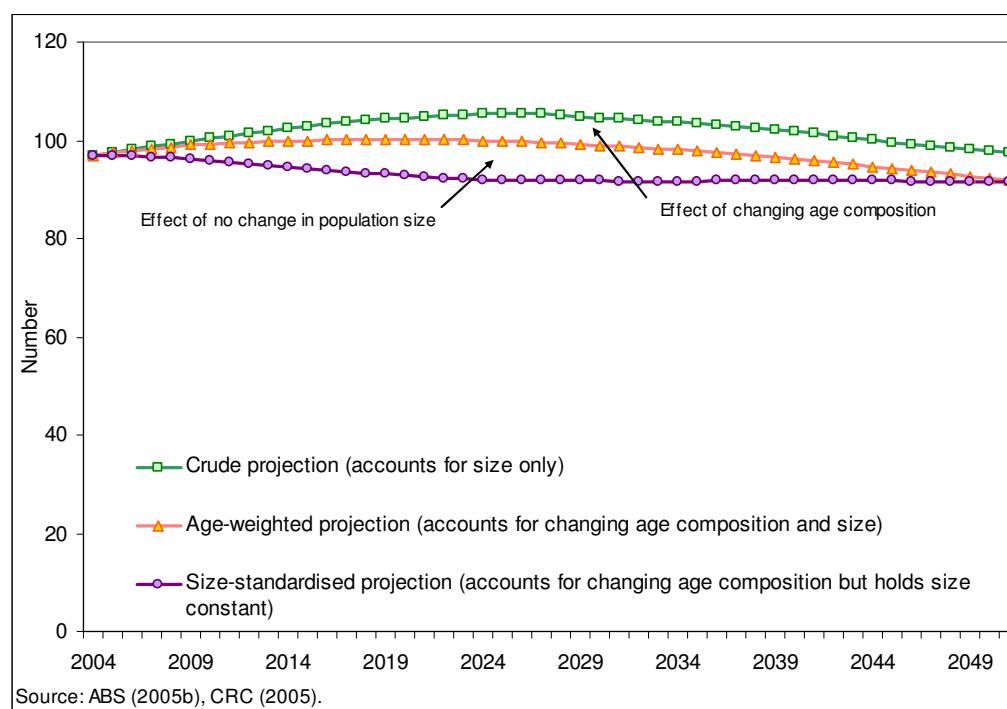


Figure 14.4.1.1: Projected Male South Australian Apprehensions (at 2004 rates), Sexual Offences: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.5 Robbery and Extortion

Robbery and extortion-related apprehensions, the smallest offence category in the analysis (which from Chapter 7, accounted for a negligible proportion of all South Australian apprehensions in 2004), are considered in this section.

Due to the very low base of female apprehensions for this particular offence, they are (again) excluded from the analysis.

14.5.1 Male Population

The crude projection (at the 2004 total apprehension ratio, and projected population size) shows male apprehension numbers for this offence category to first rise through to 2025, and subsequently decline, increasing overall by 0.5 per cent, from 320 apprehensions in 2004 to 321 apprehensions in 2051 (Figure 14.5.1.1). Conversely, assuming the population ages structurally and grows as projected (the age-weighted projection), numbers will be lower in 2051 by 19 per cent, or 62 apprehensions (dropping to 259 apprehensions), while if the population ages structurally but does not grow (the size-standardised projection) numbers will be lower by a further 0.05 per cent, or one apprehension, but with an accelerated period of decline through to 2034. Each of these analyses reflects the findings for previous offence categories, with structural ageing having the potential to reduce apprehension numbers.

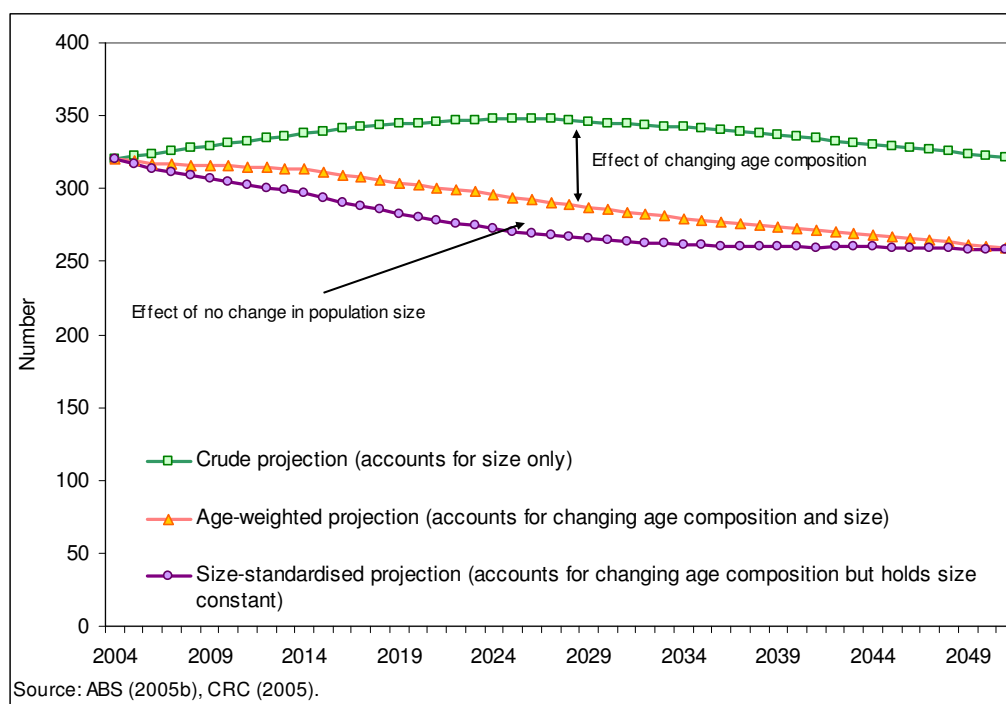


Figure 14.5.1.1: Projected Male South Australian Apprehensions (at 2004 rates), Robbery and Extortion: Crude, Age-Weighted, and Size-Standardised Numbers, 2004-2051.

14.6 Summary and Conclusions

The two conclusions drawn from the aggregate prospective analysis of South Australian apprehension trends, 2004-2051, are generally evident in the disaggregate analysis. That is:

1. Structural ageing can be expected to have a sizeable negative impact on apprehension levels. Thus, the age composition expression of the age structure-crime pattern (or the atypical expression of the Easterlin hypothesis) is supported. Numbers could be expected to be a little lower if the population aged less than projected, or a little higher if the population aged more than projected.
2. Population size is likely to have a small, positive influence on apprehension levels. Thus, numbers will be a little lower than the age-weighted projection if the population didn't grow, or a little higher if the population grew more than projected.

The potential impact of structural ageing on apprehension levels is generally sizeable across offence categories, for both sexes. However, the findings suggest that it will be most influential in relation to the offence category with the youngest age distribution of offenders (offences against property) and least for one of the offence categories with an older age distribution of offenders (male sexual offences); this concurs with the proposition put forward in Chapter 3. In this respect, the marginal difference in the prospective impact of age composition across offence-specific apprehension numbers appears to be driven by variance in the underlying age distribution of offenders (and thus, the age-crime pattern).

Findings in relation to disaggregate projected apprehension levels for Western Australia, summarised in Tables 14.6.1 and 14.6.2, also reflect these conclusions. For all offence categories, changing age composition could be expected to reduce apprehension numbers, but numbers will be somewhat lower again should the population not grow in size. The potential impact of structural ageing is (again) very similar across offence categories, but greatest for offences against property and smallest for (male) sexual offences. However, while for some apprehension measures

Table 14.6.1: Summary of Change in Projected Male Western Australian Apprehensions, by Each Standardised Component.

		2004	2014	2024	2034	2044	2051	Overall Change
		(N)	(N)	(N)	(N)	(N)	(N)	(%)
Against Property	Crude Projection	3,127	3,683	4,166	4,506	4,777	4,948	58.0
	Age-Weighted Projection	3,127	3,437	3,600	3,746	3,908	4,002	19.0
	Size-Standardised Projection	3,127	2,918	2,702	2,600	2,558	2,529	58.0
Against the Person	Crude Projection	4,542	5,350	6,051	6,544	6,939	7,186	58.0
	Age-Weighted Projection	4,542	5,091	5,476	5,736	5,984	6,154	14.0
	Size-Standardised Projection	4,542	4,322	4,110	3,981	3,917	3,889	58.0
Fraud and Misappropriation	Crude Projection	576	678	767	830	880	911	58.0
	Age-Weighted Projection	576	649	702	736	768	790	13.0
	Size-Standardised Projection	576	551	527	511	503	500	58.0
Sexual Offences	Crude Projection	570	671	759	821	871	902	58.0
	Age-Weighted Projection	570	652	724	771	811	837	7.2
	Size-Standardised Projection	570	553	543	535	531	529	58.0
Robbery and Extortion	Crude Projection	310	365	413	447	474	490	58.0
	Age-Weighted Projection	310	339	354	369	385	394	20.0
	Size-Standardised Projection	310	287	266	256	252	249	58.0
Total (Males)	Crude Projection	9,125	10,748	12,157	13,148	13,940	14,438	58.0
	Age-Weighted Projection	9,125	10,167	10,857	11,358	11,855	12,177	16.0
	Size-Standardised Projection	9,125	8,632	8,149	7,882	7,760	7,696	58.0

Source: ABS (2005b), CRC (2005).

Table 14.6.2: Summary of Change in Projected Female Western Australian Apprehensions, by Each Standardised Component.

		2004	2014	2024	2034	2044	2051	Overall Change
		(N)	(N)	(N)	(N)	(N)	(N)	(%)
Against Property	Crude Projection	655	769	870	939	988	1,018	55.0
	Age-Weighted Projection	655	715	755	785	817	837	18.0
	Size-Standardised Projection	655	609	568	548	542	539	55.0
Against the Person	Crude Projection	1,031	1,211	1,369	1,477	1,555	1,602	55.0
	Age-Weighted Projection	1,031	1,129	1,205	1,259	1,310	1,343	16.0
	Size-Standardised Projection	1,031	962	907	879	869	864	55.0
Fraud and Misappropriation	Crude Projection	372	437	494	533	561	578	55.0
	Age-Weighted Projection	372	412	438	458	477	490	15.0
	Size-Standardised Projection	372	351	330	320	316	315	55.0
Sexual Offences	Crude Projection	...	...	...	...	...	...	...
	Age-Weighted Projection	...	...	...	...	...	...	...
	Size-Standardised Projection	...	...	...	...	...	...	...
Robbery and Extortion	Crude Projection	...	...	...	...	...	...	...
	Age-Weighted Projection	...	...	...	...	...	...	...
	Size-Standardised Projection	...	...	...	...	...	...	...
Total (Females)	Crude Projection	2,058	2,417	2,733	2,949	3,103	3,198	55.0
	Age-Weighted Projection	2,058	2,256	2,398	2,503	2,603	2,669	17.0
	Size-Standardised Projection	2,058	1,921	1,806	1,747	1,726	1,718	55.0

Source: ABS (2005b), CRC (2005).

age composition effects can be expected to have a greater impact for Western Australia than South Australia, this is not always the case. This finding is not entirely consistent with the expectation that the apprehension levels of the 'younger' Western Australian would be impacted by structural ageing at a higher level than the 'older' South Australia in the future.

This closes this thesis's investigation of the age composition expression of the age structure-crime pattern. The next chapter concludes this thesis, bringing together the results of the various stages of the quantitative analyses.

Chapter Fifteen – Conclusions

This thesis has examined the impact of structural ageing on Australian crime trends, using apprehension rates as an indicator. At its heart is the well-known age-crime pattern, where persons aged around 15-24 years account for the majority of offending. Secondly it extends that concept to examine what I term the ‘age structure-crime pattern’: the impact on offence rates from changes in the proportion of the population that is accounted for by 15-24 year olds. Neither the age-crime pattern nor the age structure-crime pattern had previously been investigated with regard to Australia. However, as traditional perceptions of age-crime trends were evident in the country’s official offence statistics (with persons around 15-24 years of age accounting for a clear majority of apprehensions), and Australia’s population is ageing structurally, there was reason to believe that Australian offence levels should have been reduced or contained to some extent by population change.

The thesis’s central theoretical premise is the Easterlin hypothesis (1987a), which has been used here to bring together age-related demographic and crime trends. In its classic formulation, the Easterlin hypothesis considers how the life chances of a birth cohort, and particularly its income level relative to that of other cohorts (his ‘relative income’ hypothesis), are dependent on its size. Easterlin proposes that one of the manifestations of this interaction is a fluctuation in the level of social disorganisation, such as crime, across birth cohorts.

Easterlin clearly articulates one particular aspect of the age structure-crime pattern. This classic expression, which I refer to in this thesis as the cohort density expression, relates to an expectation that age-specific offence rates will be higher for large birth cohorts than those of smaller birth cohorts because they experience higher levels of internal cohort density. Large cohorts will subsequently experience higher levels of internal competition and stress and, thus, lower relative income.

Following a careful reading of Easterlin’s arguments, I realised that a second dimension is reflected in his hypothesis; one which has been less clearly articulated

in the relevant literature. This atypical expression, which I refer to as the age composition expression, relates to a multiplier effect between age-specific offence rates and birth cohort size. That is, a population's total apprehension rate can theoretically be expected to rise and fall in accordance with the size of the birth cohort occupying the young crime-prone ages.

As noted, the other main theoretical framework for this thesis relates to the nature of the age-crime pattern *per se*. There are two main perspectives in this regard. On the one hand, there is a perception that the association between age and crime is one of variance. Greenberg (1977, 1983, 1985), in particular, argued that empirical evidence suggests the age distribution of offenders differs by offence, which means that the underlying causes of crime cannot be the same at each age. As a result, sociological theories were not adequately accounting for differences in offence patterns across the life course. Furthermore, Greenberg (1983, 1985) argues that a cohort experiencing the same life event around the same age may cause a variation in the age-crime pattern if it causes a particular cohort to experience particularly high or low age-specific offence rates.

Conversely, Hirschi and Gottfredson (1983) believe that empirical, conceptual, and theoretical aspects of existing literature suggest that the association between age and crime is so robust that it is invariant. They hold that differences across time, place, gender, and offence are minimal, regardless of methodology. Age-crime theories over-emphasise the influence of social forces or life events and thus unnecessarily complicate the so-called 'facts' of crime. In this respect, Gottfredson and Hirschi (1990) would argue that although cohorts may represent an offender group whose conditions have caused them to offend at a higher or lower level than normal, they are not an actual source of variation in the age-crime pattern.

From these two theoretical frameworks (the Easterlin hypothesis, and the nature of the age-crime pattern), the two dimensions of the Easterlin hypothesis were respecified for this thesis with some further crime-specific propositions. With regard to the cohort density expression (the classic expression of the Easterlin hypothesis), the largest birth cohort in Australian history is the cohort born 1968-74 (with peak

cohort size occurring in 1971). It was proposed that this cohort could be expected to show the greatest extension of participation in criminal activity beyond the (conceptual) age-crime pattern, thus indicating that large birth cohorts were a potential source of variance in the age-crime pattern. As for the age composition expression (the atypical expression of the Easterlin hypothesis), it was proposed that total apprehension rates in Australia would be reduced or contained by age composition effects because the younger age groups are experiencing a reduction, and the older age groups an increase, in their share of the population. In addition, it was proposed that the extent of variability in cohort and/or age composition effects by offence and/or gender would provide an indication of variance (or not) in the underlying association between age and crime.

The two expressions of the age structure-crime pattern were investigated over three stages, being (a) an initial explorative analysis (building to a correlation analysis) to provide some indication of change in apprehension trends, including whether the age distribution of offenders seemed to be shifting upwards concomitantly with structural ageing, (b) a cohort analysis of total and offence-specific apprehension trends, which were subsequently compared by cohort to determine which (if any) cohort had experienced departures from the age-crime pattern, and (c) a comparative analysis of retrospective and prospective total and offence-specific apprehension trends to determine whether change in age composition has had a negative impact on apprehension levels. Analyses were restricted to two regions: South Australia and Western Australia. This is because these were the only regions for which population and crime data were organised by corresponding age groupings, sex, and available for a long period of time, as well as the latter being organised by offence. Based on differences in the rate of ageing for these two sub-national populations, it was also proposed that the retrospective impact of structural ageing would be greater for the 'older' region (South Australia), while its prospective impact would be greater for the 'younger' region (Western Australia, which is yet to really start ageing).

The first level of the analysis found that two offence categories (particularly offences against property, which is regarded as having the youngest age distribution of offenders of those categories analysed in this thesis) accounted for the majority of

apprehensions. The age-crime pattern was evident in the apprehension trends of the regions considered. However, while young persons continue to dominate apprehension levels, the proportion of all apprehensions that they account for was found to be falling, while those accounted for by older persons was rising. This change is occurring at the same time that young persons' share of the general population is declining, and that of older persons is increasing. Correlation analysis presented strong evidence of a (mostly) positive relationship between change in the age distribution of offenders and structural ageing. The strength of the relationship was often sizeable, but differed a little across state, apprehension categories, and the period of investigation. The strength of the relationship in Western Australia, 1994-2002, for example, ranged from no relationship (robbery and extortion) to a very strong positive (offences against the person). In comparison, the relationship ranged from a very strong negative (robbery and extortion) to moderate positive (sexual offences) in South Australia, 1998-2004; these same two apprehension categories indicated a very strong positive relationship in the preceding 1987-1997 period. This level of the analysis thus provided tantalising evidence of cohort effects extending participation in criminal activity beyond the young crime-prone ages and differences in sub-national apprehension trends being related to differences in sub-national rates of ageing. Findings also strengthened the expectation that total apprehension levels were being reduced by age composition effects, and suggested that the age-crime pattern may be both variant and invariant.

The second level of the analysis, relating to the cohort density expression, could only be analysed in relation to five Western Australian birth cohorts (born between 1957-60 and 1973-76) in 1994, 1998 and 2002. Age-specific apprehension ratios showed the age-crime pattern to be generally invariant when organised cross-sectionally (as suggested by Hirschi and Gottfredson), but variant when reorganised to show cohort-specific apprehension trends (as suggested by Greenberg). Most importantly, departures from the age-crime pattern were indicated for the large male and female cohorts born 1969-72 and 1973-76 (these being the cohorts that most closely reflect the period of the Australian baby bust, hence suggesting that large birth cohorts are a source of variance in the age-crime pattern). Thirteen of these departures were significant or substantial (i.e. increasing or relatively stable apprehension ratios as

the cohorts aged). Smaller cohorts also experienced departures from the age-crime pattern. However, only six were significant or substantial. Furthermore, the smaller cohorts were more likely to experience apprehension ratios that were consistent with the age-crime pattern (i.e. the rates declined as the cohort aged) than the larger cohorts. Indeed, the large cohorts departed from the age-crime pattern for all apprehension categories except the relatively small category of robbery and extortion for males. It is possible that the ages at which apprehension trends for the two larger cohorts were observed did not cover a sufficient period of time for any cohort effect in relation to this offence category to emerge; the smaller cohorts indicate departures from the age-crime pattern for such offences at an age that, in this analysis, the large cohorts had not yet reached.

Some variation in the apprehension trends of the large pivotal cohorts (born 1969-72 and 1973-76) are indicated by leading and lagging edge cohorts, gender, and apprehension category. For males, the cohort born 1969-72 experienced five significant or substantial departures from the age-crime pattern; the cohort born 1973-76 experienced only two. In contrast, the female cohort born 1973-76 experienced only significant departures from the age-crime pattern, while that born 1969-72 experienced only two. Thus the leading edge cohort (born 1969-72) which, despite being larger, experienced a lower level of relative disadvantage than the slightly smaller lagging edge cohort (born 1973-76), indicates the greatest departure from the age-crime pattern in relation to male apprehension trends, and vice versa for female apprehension trends. Some further differences by offence category were also indicated across these two cohorts; in relation to (male) offences against property and offences against the person, for example, a significant or substantial departure is indicated for the cohort born 1969-72 compared to a minor departure for the cohort born 1973-76. More generally, however, the large male cohorts showed greater departures from the age-crime pattern for offence categories with an 'older' age distribution of offenders (i.e. fraud and misappropriation, and sexual offences), while the equivalent female cohorts showed greater departures for those with a 'younger' age distribution of offenders (i.e. offences against property, and offences against the person). These findings thus indicate some potential underlying differences in the

age-specific causes of crime and offence-specific age distributions of offenders for males and females.

The proxy variable for relative disadvantage that was used in this thesis – unemployment – presented as a plausible explanation for the cohort effects experienced by the pivotal cohorts born 1969-72 and 1973-76. These cohorts experienced particularly high unemployment rates when they were first entering the workforce, and were more likely to deviate from the age-crime pattern than their smaller counterparts. While this finding is consistent with the strain perspective of the association between unemployment and crime, some of the other findings contradict previous analyses of the association. The impact of cohort density was not necessarily greater for neither offences against property or male apprehension trends as proposed. There was also no clear indication of an age-graded interaction between unemployment and crime. In this respect, Wadsworth's (2004: 4) suggestion that countries experiencing 'higher levels of disorganization or instability, segregation, and labour force marginalization' will concomitantly experience a more general high level of crime appears to extend to birth cohorts. Thus classic connotations of crime (i.e. age- and unemployment-crime trends) will not necessarily apply to the offence trends of large birth cohorts. Rather, large birth cohorts should be tentatively regarded as 'unique' groups of offenders.

The third level of the analysis, which focused on the age composition expression, found that changing age composition has had, and should continue to have, a negative impact on apprehension levels, either reducing apprehension numbers or containing them. That is, apprehension levels would have been higher than observed in the absence of structural ageing, or, with respect to the prospective analyses, could be expected to be lower than the crude projection assuming that the population ages as projected. Changing age composition was also seen to have a similar influence on males and females.

The retrospective analyses could be conducted in relation to only South Australian apprehension trends between 1987 and 2004 (which in fact needed to be separated into two analyses, for the periods 1987-1997 and 1998-2004, due to a change in

counting rules). Total apprehension numbers for males and females increased by 57 and 50 per cent respectively over the earlier period, while age-standardisation indicates that this increase was contained by a respective 10 and 9.3 per cent by structural ageing. Subsequently (between 1998 and 2004), total apprehension numbers for males and females fell by 16 and 21 per cent respectively, which were reduced by a further four per cent for both sexes as a result of age composition effects. The change in counting rules may have had some influences in these findings, but it is at least equally likely that it is symptomatic of change in the rate of decline in young person's share of the population. Indeed, the proportion of young persons (males and females) in the South Australian population declined by approximately 18 per cent between 1987 and 1997, compared to less than one per cent between 1998 and 2004 (ABS 2005a).

The impact of changing age composition was not, however, the same for each offence category, particularly over the earlier period. Although its influence was generally the same for all but the 'older offender' category of sexual offences (having no real influence on observed numbers for males during the 1987-1997 period), it was a little greater for offences against property (reducing observed numbers by as much as 13 per cent, also for males during the earlier period). As the largest of the offence categories in the analyses, and the category most characterised by youthful offending, it will consequently have made the greatest contribution to change in overall apprehension levels. This finding supports the proposition that the age composition expression would be stronger for 'younger' offences than 'older' offences, and hence suggests that there may be some variance in the association between age and crime.

Age composition also had either a greater or equal impact on apprehension numbers as that of change in population size (which increased numbers by around six per cent for both sexes over the earlier period, and by no more than four per cent over the latter period). However, it is a lesser impact than that of underlying change in apprehension ratios (which increased numbers by as much as 41 per cent for males over the earlier period, and reduced them by as much as 29 per cent for females over the latter period). The latter finding was confirmed by decomposition, with age

composition effects accounting for around 30 per cent of the difference in crude (observed) apprehension ratios between 1987 and 1997, and no more than 16 per cent between 1998 and 2004 (thus accounting for less of the change than underlying change in apprehension ratios).

The prospective analysis could be conducted for both Western Australia and South Australia for the period 2004-205, and indicates that the impact of structural ageing can be expected to be sizeable for both regions. It will, however, be a little greater (mostly) for the former than the latter. While crude projections suggest minimal change in (total) South Australian apprehension numbers (males and females), age-weighting analysis suggests a drop in numbers of 18 per cent if the population ages structurally as projected. Conversely, while a much greater increase in the crude projections for (total) apprehensions in Western Australia can be anticipated (as much as 58 per cent for males, indicative of the ongoing growth in population size for the region), changing age composition cannot be expected to reduce numbers by any more than 17 per cent (for females). This finding does not reflect the difference in projected change in age composition across the two regions. Although the South Australian population is currently the older of the two, a higher level of prospective change is anticipated for Western Australia. Between 2004 and 2051, young male and female Western Australians are expected to experience respective declines in their population share of around 23 and 21 per cent (ABS 2005b). This compares to declines of around 22 and 19 per cent for equivalent South Australians. However, this change for South Australia does reflect acceleration in the rate of decline in young persons' population share from the period 1998-2004, which would explain why age composition effects are seen to have a greater impact on prospective apprehension trends than during that intervening period. For both regions, however, the influence of age composition effects will be a little greater for the offence category with the 'youngest' age distribution of offenders (reducing the number of male offences against property in both regions by 18 per cent) and somewhat smaller for the offence category with one of the 'oldest' age distribution of offenders (reducing male sexual offences in South Australia by only 5.8 per cent).

The three stages of the analysis indicate, therefore, that the impact of structural ageing has generally slowed in recent years for South Australian apprehension trends, but accelerated for Western Australian apprehension trends. The strength of the correlation between change in age composition and the (total) age distribution of offenders weakened across the 1987-1997 and 1998-2004 periods for South Australia (from $r = 0.33$ to 0.20), as did the impact of age composition effects (the difference between male observed and age-standardised total apprehension numbers falling from ten to 3.8 per cent). In 1998-2002, the strength of the correlation between change in age composition and the age distribution of offenders in Western Australia ($r = 0.49$) was greater than that for the most comparable period regarding South Australian apprehensions; cohort effects were also more likely to occur during the 1998-2002 period than the preceding 1994-1998 period. These differences have, as suggested previously, occurred concurrently with differences in the progression of ageing for the two sub-national populations. However, although Western Australia can be expected to age at a (slightly) higher level than South Australia in the future, the prospective impact of age composition effects (between 2004 and 2051) will not necessarily be higher for the former than the latter. For example, the difference between the (total) crude and age-weighted projections for males is 18 per cent in South Australia compared to 16 per cent in Western Australia. Conversely, for offences against property, the difference between the two projections is the same for males, while for females, the difference is 16 per cent in South Australia compared to 18 per cent in Western Australia.

Easterlin's hypotheses regarding the association between population change and crime are thus strongly supported for Australia, at least insofar as apprehension trends in South Australia and Western Australia can be taken as indicative. However, there may be some refinements. With regard to the cohort density expression, both of the largest male and female cohorts indicated cohort effects causing an extended participation in criminal activity, across the majority of offence categories, but not at an entirely consistent level. These differences cannot be easily explained by differences in age- or unemployment-crime trends, but may be related to the differing experiences of leading and lagging edge cohorts. Size alone may be more influential with regard to male birth cohorts, but it appears that the experiences of relative

disadvantage may be more influential for females. With regard to the age composition expression, structural ageing generally has the same impact on males and females and across offence categories. It does, however, have a slightly greater effect on offences with a 'young' age distribution of offenders and the least on those with an 'older' age distribution of offenders. Its impact will also vary over time and region depending on the rate of change in young person's share of the general population.

Consequently, birth cohorts are clearly a source of variance for the age-crime pattern, as Greenberg (1983, 1985) implied. There are also some differences by gender and offence category, implying that there may be some variation in the underlying age-crime pattern with regard to the age distribution of offenders, the mean age of offending, causes of crime, and so forth. However, these differences are quite small, and cross-sectional analysis of age-specific apprehension ratios indicated that, regardless of cohort and age composition effects, the age-crime pattern was generally evident. In particular, young persons still account for the clear majority of crime. It may be more appropriate, therefore, to suggest that the age-crime pattern is in fact highly generalisable (as suggested by Britt (1992), Tittle and Grasmick (1998), and Sampson and Laub (2005a)), with birth cohorts being an example of a 'condition in which age does not have as strong an effect as usual [and] the age effect may be to some extent obscured' (Gottfredson and Hirschi 1990: 128). This conclusion concurs with O'Brien and Stockard's (2009) interpretation of the association between cohort effects and the age-crime pattern; they found the age-crime pattern not be 'rigidly invariant' because cohort replacement was a significant source of variation in the age distribution of homicide offenders, but the age-crime curve for the offence to be otherwise relatively constant over time.

It also needs to be remembered that the findings identified in this thesis are only indicative of known crime for which an alleged offender has been apprehended – not necessarily charged or imprisoned. Thus, they pertain only to a proportion of all crime.

The methodological objectives of this thesis may account for the consistent support for Easterlin's hypotheses. Doing 'true' cohort analysis shows much clearer evidence of a shift upwards in the apprehension levels of large birth cohorts as they age than do the more sophisticated (mathematical) techniques used in much of the international analyses of the cohort density expression. Similarly, decomposition analysis has not been widely applied in the analyses of the age composition expression, and often showed a higher level of change accounted for by structural ageing than standardisation alone. All analyses use age-specific apprehensions data, albeit for two sub-national regions only, whereas many of the international analyses have had to resort to age-adjusting crime data in the absence of the desired data by age (Steffensmeier and Harer 1987 and 1991, for example). In addition, this thesis has used population data that is specific to the jurisdiction, whereas many international analyses have assessed regional age composition effects based on national ageing trends only. Being able to investigate the age structure-crime pattern for an older and younger region proved useful, illustrating that differences in regional ageing will (generally) concur with differences in regional offence trends. The type of data used in this thesis are the more desirable for demographically-weighted analyses to be conducted, and consequently, these data requirements should be kept in mind by those who control how data are collected and/or released. Limitations in Australian crime data collections made an analysis of the age structure-crime pattern for the population more challenging than initially anticipated. It will be some time before the recently initiated national collection by the ABS (2009) will be suitable for the types of analyses in this thesis, and few regions release appropriately (and consistently) organised age-specific offence data, particularly for a long period of time.

On a similar note, relating the findings of the cohort analysis to both size *and* relative disadvantage suggests, as previously raised, that while the size of large cohorts *per se* may be more influential for males, it appears that relative disadvantage may be more influential for females. Women's labour market experiences expanded relative to men, from the 1970s to the noughties, even during periods of high unemployment (ABS 2001). At the same time, there has been a shift in cultural expectations concerning women's role from one of passive and dependent to one of active and

independent. It has been argued that such change have resulted in increased opportunities for, and/or willingness of, women to commit crime (Box 1983: 165-200; Simon 1975). In this respect, the above finding may be indicative of these factors to some extent and, thus, has the potential to contribute to these debates.

Extending the cohort analysis to include the period 2006 (which was precluded because of lack of data at the time of conducting my analysis) would further assist in determining whether the impact of higher internal cohort density ceases once the cohort has passed out of the young crime-prone ages or whether its influence is more enduring across the life course. Analysis of the cohort density expression could also be extended by considering cohort-specific offence trends in light of other factors that Easterlin associates with high cohort density and subsequent relative disadvantage. These could include marriage/partnering or fertility-related variables (with Easterlin suggesting that members of large birth cohorts may delay marriage and having a family as a strategy to compensate for the relative disadvantage that they experience) and education-related variables (with Easterlin proposing that large cohorts will experience crowded class rooms). Marriage, for example, was indicated in Chapter 2 to be associated with desistance from crime, so changes in the timing of marriage (like a delay) for large birth cohorts could thus conceivably be associated with an increase in their offence levels. The variable impact of changes in policing and reporting levels across age groups could also make an attempt to differentiate between the impact of higher cohort density and that of age-specific criminal justice influences on extended participations in criminal activity regarded as cohort effects in this thesis a useful direction of research.

More recent data (both apprehensions and population projections) are also available now with regard to testing the age composition expression. However, while they would produce results at slightly higher or lower levels than indicated in this thesis (depending on changes in the underlying population projections), the findings and their directions (i.e. that structural ageing is reducing or containing, and will continue to reduce or contain, apprehension levels), should not be very different.

One way to further refine the analysis of both expressions of the Easterlin hypothesis would be to examine specific offences rather than offence categories – provided that the bases were large enough to conduct valid analyses. This may provide insight as to the small differences in the impact of cohort density and age composition effects across offence categories. Specifically, for example, whether there are any particular offences that account for the majority of change arising from structural ageing within each offence category, or whether the impact of structural ageing is more general across offence categories.

In addition, should the relevant apprehension data become available, the impact of the ethnic differences referred to in Chapter 1 – that may bear an influence on the results of the analyses discussed here – could be examined. There are two possibilities in this regard. First, how variation in the formative years experienced by migrant and Australian-born residents may contribute to different cohorts (with around 14 per cent of the large birth cohort born 1968-74 having been born outside of Australia (ABS 2008c), and thus potentially spending their formative years in their country of birth). Second, how variation in the age structures of Aboriginal and non-Aboriginal populations may contribute to different levels of age composition effects.

The findings presented in this thesis should prove useful to police, criminal courts, and correctional facilities in planning for the number of persons who are likely to come into contact with the criminal justice system in the future. Recent increases in apprehensions for young persons may be a short-term trend that will ease once the large cohorts have passed out of these ages. However, a subsequent increase in apprehension levels around the middle adult age groups could be anticipated as these cohorts progress through their respective life courses. Furthermore, it would appear that large cohorts should be treated as ‘unique’ offender groups. Their apprehension trends do not fit comfortably with accepted age- or unemployment-crime trends; all offence categories have been influenced by the increase in numbers at young ages caused by large birth cohorts occupying these ages. Total offence levels, however, have been reduced or contained by change in age composition, regardless of whether actual numbers have increased or declined over time, and this trend can be expected to continue. Similarly, by identifying the impact of cohort and age composition

effects on apprehension trends, this thesis may contribute to broader debates about the reasons for changes in apprehension rates, such as whether police strategies of zero tolerance have contributed to change in apprehension rates or, as previously discussed, changes in the role of women have contributed to an increase in female offending.

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Appendix A – Information Regarding Analytical Techniques

A.1 Cohort Analysis

Cross-Sectional Organisation: The two forms of data (population and apprehensions) are used to calculate age-specific (crude) apprehension ratios for each year and age bracket in the analysis. The number of years in the age brackets will determine the number of years between observations. For example, if each age bracket reflects a period of four years, then age-specific apprehension ratios are observed every four years. The age-specific (crude) ratios (per 100) are derived by dividing the number of apprehensions by the number of persons in the equivalent general population specific to the year and age bracket:

$$P_x^{c \ t...t+n} = P_x^t / p_x^{t...t+n}$$

Where P = Apprehensions

p = population

x = age group

t = time

c = crude

equation (1)

These age-specific apprehension ratios are organised cross-sectionally, as indicated in Table A.1.1 (annotated to reflect the organisation of the data used in the analysis), and indicate how age-specific offence trends have change over time:

Table A.1.1: Cross-Sectional Organisation of Age-Specific Apprehension Ratios.

	1994	1998	2002
18-21			
22-25			
26-29			
30-33			
34-37			
38-41			
42-45			

Longitudinal Analysis: The age-specific apprehension ratios from the cross-sectional analysis are subsequently reorganised longitudinally (Table A.1.2). The purpose of this process is to reflect how individual cohorts experienced change in their respective age-specific apprehension ratios over their respective life courses at four year intervals.

Table A.1.2: Longitudinal Organisation of Age-Specific Apprehension Ratios.

	18-21	22-25	26-29	30-33	34-37	38-41	42-45
1977-80							
1973-76							
1969-72							
1965-68							
1961-64							
1957-60							
1953-56							

Similarly, the age-specific apprehension ratios can also be organised around a Lexis Diagram (Table A.1.3), which allows for the observation of changes in age-specific apprehension levels over time as well as changes in cohort-specific apprehension levels as they age:

Table A.1.3: The Lexis Diagram.

Age/Year Born	1994	1998	2002
14-17 (Born 1977-80)	Cohort 1		
18-21 (Born 1973-76)	Cohort 2	Cohort 1	
22-25 (Born 1969-72)	Cohort 3	Cohort 2	Cohort 1
26-29 (Born 1965-68)	Cohort 4	Cohort 3	Cohort 2
30-33 (Born 1961-64)	Cohort 5	Cohort 4	Cohort 3
34-37 (Born 1957-60)	Cohort 6	Cohort 5	Cohort 4
38-41 (Born 1953-56)	Cohort 7	Cohort 6	Cohort 5
		Cohort 7	Cohort 6

A.2 Comparative Measures (Retrospective Analysis)

To calculate the annual age distribution of the general population (the proportion of persons at each age bracket relative to the total number of persons for each year in the analysis), the total population number at each year and age bracket is divided by the total population number for the equivalent year. The result is the actual (observed) population distribution:

$$p^c x^{t...t+n} = p x^t / T p^{t...t+n}$$

Where p = population

T = Total population

x = age group

t = time

c = crude

equation (1)

The two forms of data (population and apprehensions) are used to calculate age-specific (crude) apprehension ratios for each year and age bracket. The age-specific (crude) ratios (per 100) are derived by dividing the number of apprehensions by the number of persons in the equivalent general population specific to the year and age bracket, including the total number of persons (the total age-specific crude apprehension ratio):

$$P^c x^{t...t+n} = P x^t / p x^{t...t+n}$$

Where P = Apprehensions

p = population

x = age group

t = time

c = crude

equation (2)

The population age distributions and age-specific apprehension ratios can then be used for apprehension-, size-, and age-standardisation.

Apprehension-Standardisation: For each year and age group, the age-specific apprehension ratios (equation (2)) for the initial population observed (say 1987) is held constant applied to the actual population distribution (equation (1)) across time to each year in the investigation (say the 1987-1997 period). These rates are summed on an annual basis and multiplied by the total number of persons in the general population to express the expected number of apprehensions had the initial age-specific apprehension ratios prevailed but the population aged structurally and changed in size as observed. The difference between the actual and apprehension-standardised apprehension numbers reflects the impact of change in the age-specific apprehension ratios over time.

$$P_{x^{t...t+n}}^c = \sum (P_{x^{t(1987)}}^c * (p_x^t / T_p^{t...t+n})) * T_p^{t...t+n}$$

Where P = Apprehension

p = population

x = age group

t = time

T = Total population

c = crude

equation (3)

The final step in the apprehension-standardisation process is to determine the apprehension-related effect over time as a percentage. Such figures are calculated by deducting the annual crude number of apprehensions from the equivalent apprehension-standardised number, and expressing the result as a percentage of the observed number.

Size-Standardisation: To size-weight the general population data, population distributions (from equation (1)) are applied to the first observed population size (say 1987), holding this population's total size constant and multiplying by the population distribution figures for all years and age brackets. The resultant figures express, by

year and age bracket, what the number of persons in the population across the period of analysis (say 1987-1997) would have been in the event of the initial population size continuing:

$$p^s_{x^{t...t+n}} = Tp^{t(1987)} * \sum (px^t / Tp^{t...t+n})$$

Where p = population

x = age group

t = time

T = Total population

s = size weighted equation (4)

To size-weight the apprehension data, the size-weighted population data (by year and age bracket) (from equation (4)) are multiplied by the equivalent age-specific (crude) apprehension ratio. The resultant figures are summed to reflect the total number of apprehensions across the period of analysis in the event of the initial general population size continuing, but where the population has aged over time, and also where apprehension ratios have changed over time. The difference between the actual and size-standardised apprehension numbers reflects the effect of changes in population size over time:

$$P^s_{x^{t...t+n}} = (p^s_{x^{t...t+n}}) * (P^c_{x^{t...t+n}})$$

Where P = Apprehensions

p = population

x = age group

t = time

T = Total population

c = crude

s = size weighted equation (5)

Age-Standardisation: The age-specific (crude) apprehensions ratios are age-weighted through the process of direct age-standardisation, whereby the first

observed general population distribution (say 1987) (from equation (1)) is held constant across time (applied to all years included in the analysis, say between 1987 and 1997) and multiplied by the age-specific apprehension ratios at each year. The annual age weighted, standardised ratios for the individual age brackets are summed to produce a total annual age standardised ratio (per 100). These express, as a proportion, the size of the prison population at each year and/or age bracket had that initial general population distribution remained constant across the period of the analysis:

$$P_{x^{a \dots t+n}}^a = P_{x^{c \dots t+n}}^c * \sum (p_x t^{(1987)} / T p t^{(1987)})$$

Where P = Apprehensions

p = population

x = age group

t = time

T = Total population

a = age weighted

c = crude

equation (6)

For each year in the analysis, the total age-standardised apprehension ratio (per 100) is multiplied by the corresponding total number of persons in the general population. These figures express, as a number, what apprehension levels would have been at each year had that initial general population distribution remained constant across the period of investigation, but with actual change in apprehension ratios and population size. Incidentally, the difference between than actual and age-standardised numbers reflects the effects of structural ageing on apprehension levels.

Finally, and to determine the age composition effect over time as a percentage, the annual crude number of apprehensions is deducted from the age-standardised number of apprehensions, the resultant number being divided by the actual (observed) number of apprehensions (expressed as a proportion).

Decomposition: Supplementary to standardisation of numbers, the difference in the crude apprehension ratio between the first and last year of the period of analysis (say 1987 and 1997) can be decomposed to indicate the component of change that is due to change in age composition, and the component that is due to underlying, or 'true', change (specifically changing apprehension ratios). First, the population distribution of the initial year (from equation (1)) is applied to the actual age-specific apprehension ratios of the final year (from equation (2)), and the actual age-specific apprehension ratios of the final year are applied to the population distribution of the initial year, and summed. The resultant total age-weighted ratios are manipulated with the actual total apprehensions ratios of the initial and final year observed as follows (annotated for 1987 (P1) and 1997(P2)):

Component due to changing age composition = $0.5 * (P(2) - P_2(1) + P_1(2) - P(1))$

Component due to changing apprehension ratios = $0.5 * (P(2) - P_1(2) + P_2(1) - P(1))$

A.3 Comparative Techniques (Prospective Analysis)

The method for the prospective analysis is fundamentally the same as for the retrospective analysis, the key difference being that 2004 serves as the basis for the analysis. Therefore, actual age-specific apprehension ratios are calculated for 2004 only (from equation (2)). Consequently, the prospective analysis is limited to size-standardised and age-weighting analyses. Similarly, the crude number of annual projected apprehension numbers is determined by holding the total number of apprehensions in 2004 constant, and applying this to the total projected general population number over time. Hence, crude projected numbers are based on expected change in population size.

Size-Standardisation: The annual projected population distributions (calculated using equation (1)), including the total distributions, are applied to the total number for the 2004 general population (held constant across time and age), expressing the

number of persons at each age bracket and year where population size does not change over time, but structural ageing has occurred.

These numbers are then used to size-weight the projected apprehension data. The 2004 age-specific apprehension ratios are held constant over time, relative to the applicable age bracket, and multiplied by the size-weighted population proportions at each age bracket in each year. These numbers are consequently summed, to express the number of persons by age and year in the event of the size of the population undergoing no change across 2004-51 period, but where structural ageing occurs and 2004 age-specific apprehension ratios prevailed. The difference between the actual and size-weighted apprehension numbers reflects the combined effect of change in population size and age composition over time:

$$P_{x}^{s \dots t+n} = P_{x}^{c \dots t(2004)} * p_{x}^{s \dots t+n}$$

Where P = Apprehensions

p = population

x = age group

t = time

c = crude

s = size weighted equation (7)

Age-Weighting: The 2004 age-specific (crude) apprehension ratios are held constant (calculated using equation (1)), and applied to the projected population number at each age bracket and year in the analysis. The resultant figures are summed at each year to express the annual total number of projected apprehension numbers where the population has not aged structurally, but population size changes as anticipated and assuming that 2004 age-specific apprehension ratios prevail:

$$P_{x \dots t+n}^a = P_{x \dots t(2004)^*}^c \frac{p_{x \dots t+n}}{p_{x \dots t(2004)^*}}$$

Where P = Apprehensions

p = population

x = age group

t = time

a = age-weighted equation (8)

The difference between the crude and age-weighted numbers reflects the influence of change in age composition on apprehension levels over time. This difference can also be expressed as a percentage, deducting the total age-weighted number from the total crude number, and dividing the resultant number by the crude number.

Consequently, the difference between the age-weighted and size-standardised projections reflects the effect of change in population size.

Appendix B – Information Regarding Data Sources

B.1 Organisation of OCSAR Data

Organisation of Offence Categories: Five offence categories are considered in the analyses that are calculated from OCSAR data, being offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion. Total apprehension numbers relate to the sum of these five offence categories. The total number of apprehensions for each offence category reflects the sum of offence types relative to the offence category (detailed below). The specific offences included in the annual publication of the *Crime and Justice in South Australia* series (OCSAR) are not entirely consistent over time. For example, environmental offences do not appear as an offence against property prior to 1998, and so their inclusion in the analyses would not represent continuity for that offence category. Therefore, the total number of apprehensions for each offence category has been recalculated for this thesis based on the following list of common offences (all ‘other offences’ within these categories being excluded from the analysis, as well as offence categories such as drug and driving offences):

Offences Against Property

- Shop theft
- Motor vehicle theft
- Receiving stolen goods
- Unlawful possession of property
- Property damage
- Serious criminal trespass

Offences Against the Person

- Assault (actual bodily harm)
- Assault (grievous bodily harm)
- Murder

Fraud and Misappropriation

- Fraud, forgery, false pretence and counterfeiting
- Misappropriation

Sexual Offences

- Indecent assault
- Rape
- Unlawful sexual intercourse

Robbery and Extortion

- Armed robbery
- Unarmed robbery
- Extortion

Consequently, the total numbers of offence category-specific apprehensions that are used in this thesis do not always correspond with those provided in the actual OCSAR publications.

All apprehension data is organised by gender and age (14-17, 18-19, 20-24, 25-34, 35-44, 45-59, and 60-80 years, although the youngest age group is not included in the first level of the analysis). However, the very low base of female apprehensions for both sexual offences and robbery and extortion did not allow for reliable analyses to be conducted. These numbers are, however, included in the total number of female apprehensions.

Sources of OCSAR Data: All apprehension data is adapted from the 'Offences Cleared by way of an Apprehension' section of the OCSAR *Crime and Justice in South Australia* publications (1988-2005). The specific tables are detailed as follows:

Table 6.2b Age of alleged male offenders: offences against the person (excluding sexual offences) (1988-2005)

Table 6.2c Age of alleged female offenders: offences against the person (excluding sexual offences) (1988-2005)

Table 6.3b Age of alleged male offenders: sexual offences (1988-2005)

Table 6.3c Age of alleged female offenders: sexual offences (1988-2005)

Table 6.4b Age of alleged male offenders: robbery and extortion (1988-2005)

Table 6.4c Age of alleged female offenders: robbery and extortion (1988-2005)

Table 6.6b Age of alleged male offenders: offences against property – serious criminal trespass (1988-2005)

Table 6.6c Age of alleged female offenders: offences against property – serious criminal trespass (1988-2005)

Table 6.7b Age and sex of alleged offenders: offences against property – fraud and misappropriated (1988-2005)

Table 6.8b Age of alleged male offenders: offences against property – larceny and receiving (1998-2005)

Table 6.8c Age of alleged female offenders: offences against property – larceny and receiving (1998-2005)

Table 6.9b Age and sex of alleged offenders: offences against property – property damage and environmental offences (1998-2005)

Table 2.16 Age and sex of alleged offenders: other property offences (1982-97)

Table 2.17 Age and sex of alleged offenders: other larceny (1993-97)

Table 2.15 Other larceny (1982-92)

B.2 Organisation of CRC Data

Organisation of Offence Categories: Five offence categories are considered in the analyses that are calculated from CRC data, being offences against property, offences against the person, fraud and misappropriation, sexual offences, and robbery and extortion. Total apprehension numbers relate to the sum of these five offence categories. The total number of apprehensions for each of these offence categories

reflects the sum of offence types relative to the offence category. The CRC data is not organised around any particular offence categories. For the purpose of this investigation, offences have been organised around the five offence categories of interest as follows:

Offences Against Property

- Breaking and entering/burglary
- Handling stolen goods
- Motor vehicle theft
- Property damage

Offences Against the person

- Homicide
- Assault

Fraud and Misappropriation

- Fraud and misappropriation

Sexual Offences

- Sexual Offences

Robbery and Extortion

- Robbery
- Blackmail/extortion

The offences included in the CRC apprehension data does vary slightly from year to year, but this variation relates to offences that are not focal to this investigation (drug offences, for example).

All apprehension data is organised by gender and age (18-21, 22-25, 26-29, 30-33, 34-37, 38-41, and 42-45 years, except that the age groups 14-17 and 46-80 years are also used in the first and third levels of the analysis). The offence-specific analyses exclude female apprehensions for both sexual offences and robbery and extortion

because of small numbers, but such numbers are included in the total number of female apprehensions.

Sources of CRC Data: All apprehension data is adapted from the section of the CRC's *Crime and Justice Statistics for Western Australia* publications relating to apprehensions. Recalling from Chapter 2 and Appendix A (section A.1), cohort analysis does not require data for all years included in the period of analysis; rather, observations are required at intervals relative to the numbers of years reflected in the age brackets by which the data has been organised. As indicated above, age brackets in the CRC apprehension data relates to four year groupings, and so data at four year intervals was subsequently required, these being 1994, 1998, and 2002. For each of these years, the relevant table was found in 'Table 2.2a/b: Distinct persons arrested by offence charged by age, sex and race'.

B.3 Sources of Apprehension Data in Australia

National Collections: The *Source Book of Australian Criminal and Social Statistics* (Mukherjee 1989) contains apprehension data relating to the following regions and periods of Australia:

- Vic 1945 through 1987-88
- Qld 1939 through 1986-87
- WA 1963 through 1986-87
- SA 1921 through 1986-87
- TAS 1950 through 1985-86
- NT 1962 through 1986-87
- ACT 1972 through 1987-88

The data is not organised by age or gender, and is limited to six offences (which are not available across all regions and years).

New South Wales: As noted in Chapter 6, *Recorded Crime Statistics* (BOCSAR) does not include apprehension data organised by age. However, on special request,

data could be provided for the period 1995-present that would be organised by age (10-13, 14-17, 18-19, 20-24, 25-34, 35-44, 45-59, 60-80, 81-plus, missing/unknown, total), by gender, and thirteen offence types. The data has been consistently collected and recorded over time.

Victoria: Victoria Police have released apprehension data since the 1993/94 period. This data has been organised by age (and also gender). Unfortunately, age brackets do change from year to year. The most recently released data (since 2001/02) is organised only by juveniles and adults. The earliest data (for the periods 1993/94 and 1994/95) is organised around the following age brackets: under-10, 10-13, 14-16, 17-20, 21-24, 25-29, 30-39, 40-49, 50-59, 60-plus, and unspecified. All other years have organised age as: under-10, 10-14, 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-plus, and unspecified.

This data is also quite comprehensive in terms of the number of offence types for which apprehension numbers are provided (twenty-five offences in the earlier data, but increasing to thirty in the more recent releases).

Queensland: Queensland Police have released apprehension data for the period 1995/96-present. The data is organised by age (10-14, 15, 16, 17, 18, 19, 20-24, 25-29, 30-39, 40-49, 50-59, 60-plus), and also by gender. The data is very detailed in terms of the range of offence types included (almost sixty offence types); these are also consistent over the years for which data has been released.

Tasmania: There is no age-specific apprehension data for this region that is readily available.

Northern Territory: The *Northern Territory Quarterly Crime and Justice Statistics* publication has been released since 01/02. The apprehension data is not organised by age or gender. It is, however, organised by offence (fifteen offence types, which are common to each release of data). Further, the data is organised by locality (eight in total, including Northern Territory, Darwin and Alice Springs).

B.4 Size of Western Australian Birth Cohorts

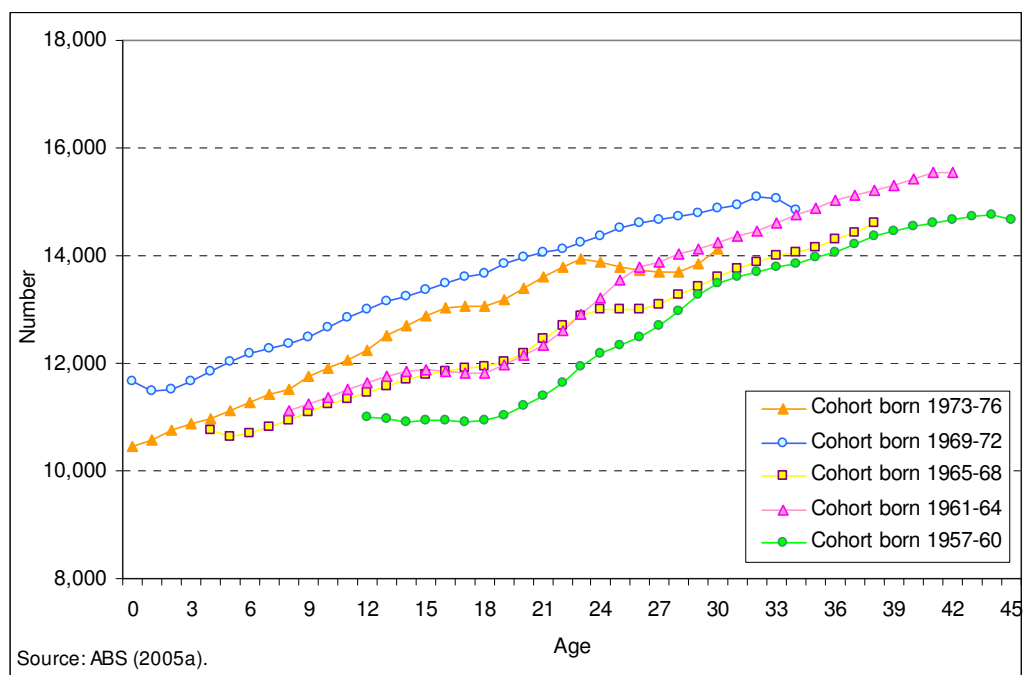


Figure B.4.1: Western Australian Male Birth Cohort Size, by Age, 1971-2002.

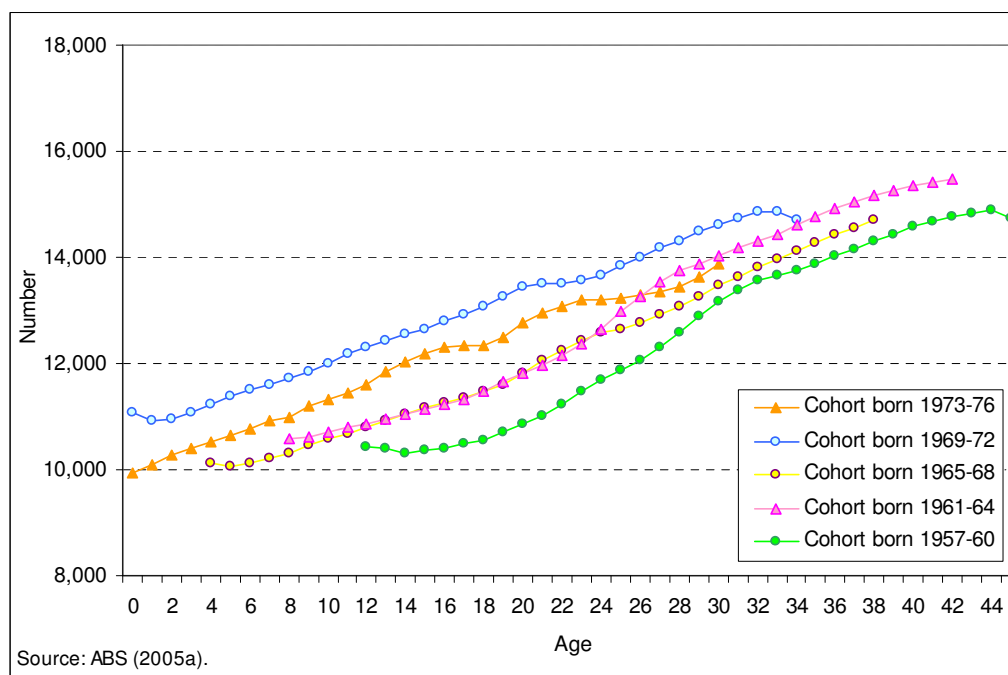


Figure B.4.2: Western Australian Female Birth Cohort Size, by Age, 1971-2002.

B.5 Age Composition of South Australian Population, 1987-2004

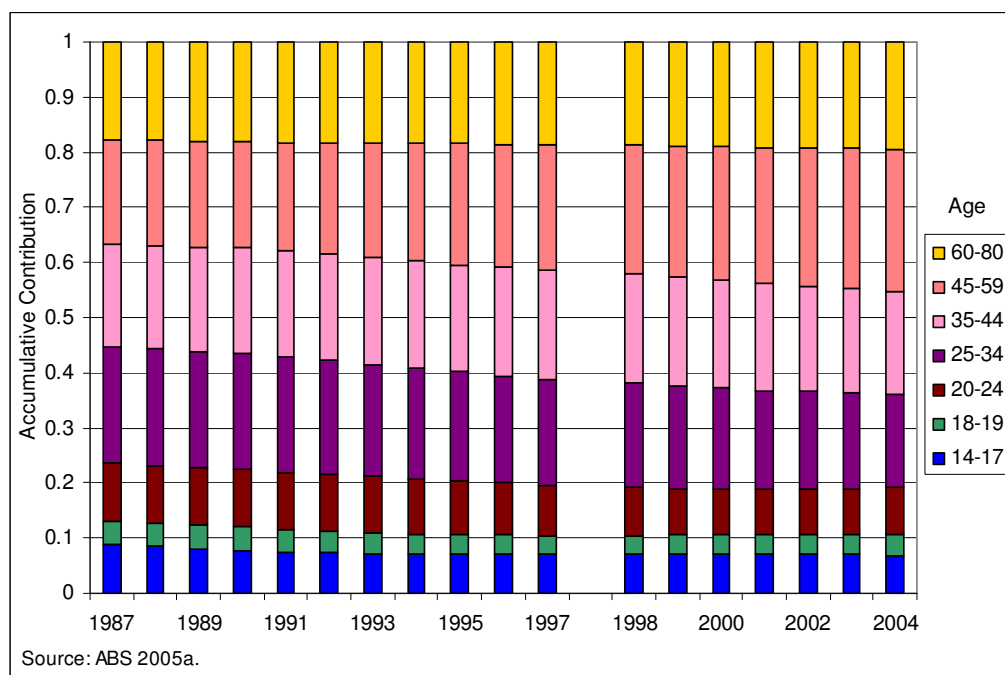


Figure B.5.1: Annual Age Composition of Male South Australian Population, 1987-1997 and 1998-2004.

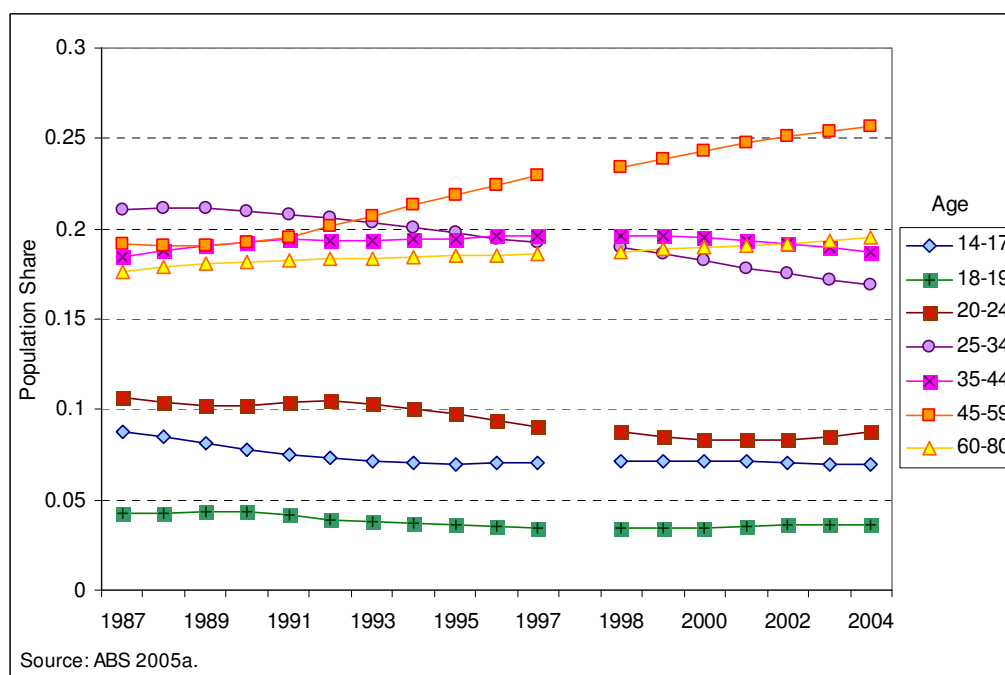


Figure B.5.2: Annual Change in Age Composition of Male South Australian Population, 1987-1997 and 1998-2004.

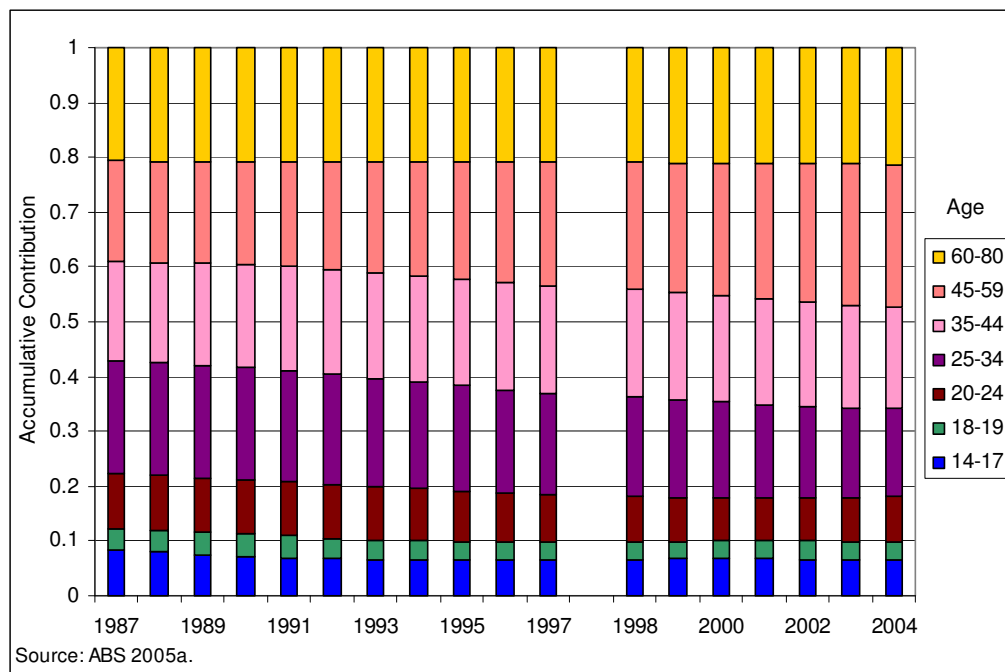


Figure B.5.3: Annual Age Composition of Female South Australian Population, 1987-1997 and 1998-2004.

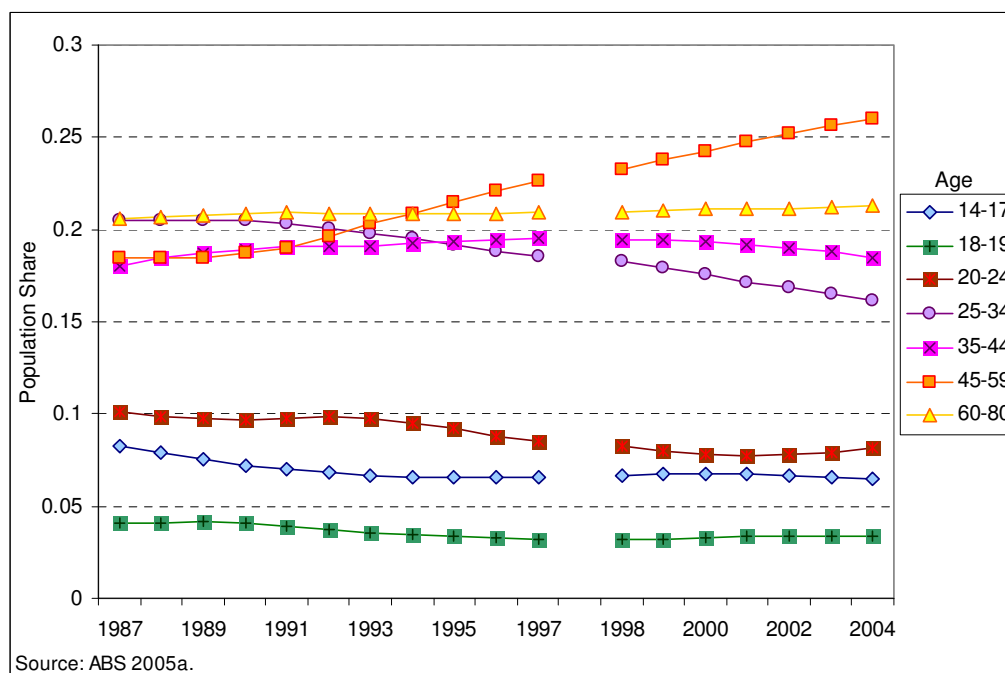


Figure B.5.4: Annual Change in Age Composition of Female South Australian Population, 1987-1997 and 1998-2004.

B.6 Age Compositions of South Australian and Western Australian Populations, 2004-2051

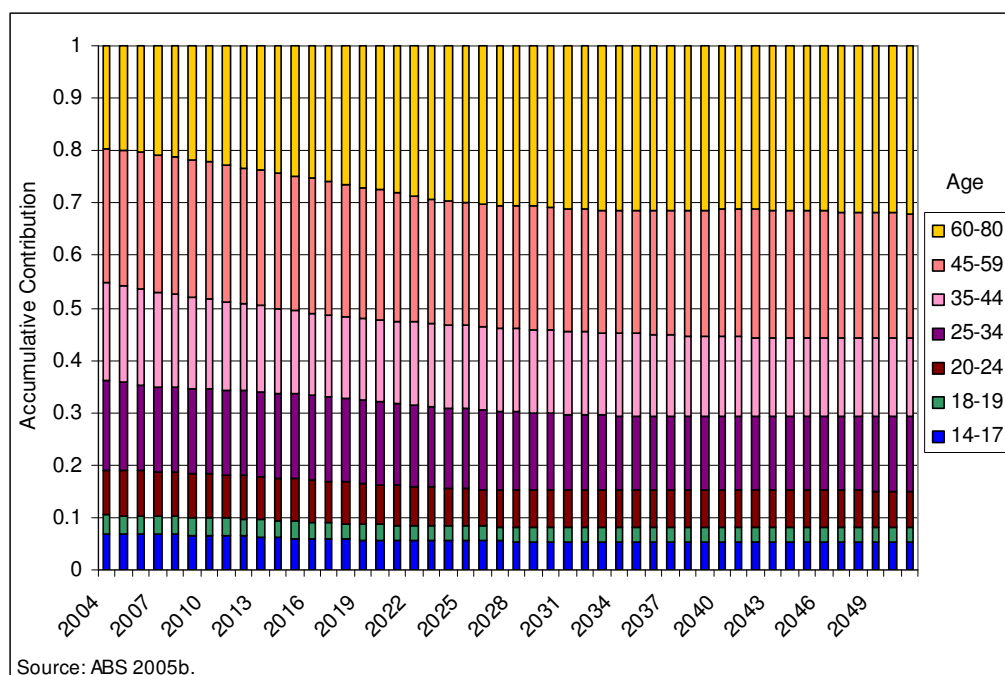


Figure B.6.1: Annual Prospective Age Composition of Male South Australian Population, 2004-2051.

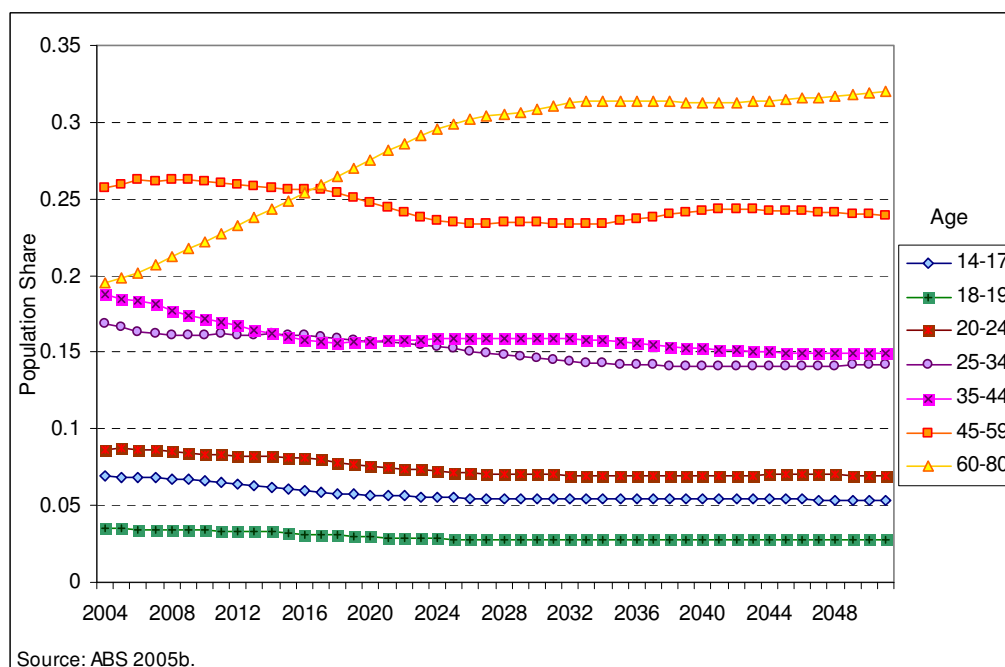


Figure B.6.2: Annual Prospective Change in Age Composition of Male South Australian Population, 2004-2051.

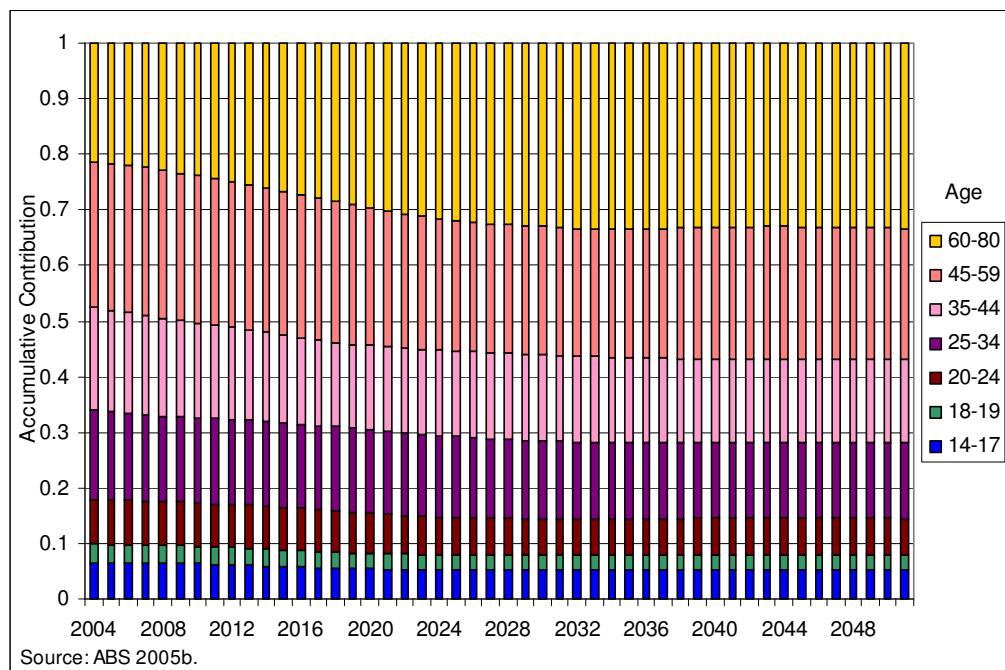


Figure B.6.3: Annual Prospective Age Composition of Female South Australian Population, 2004-2051.

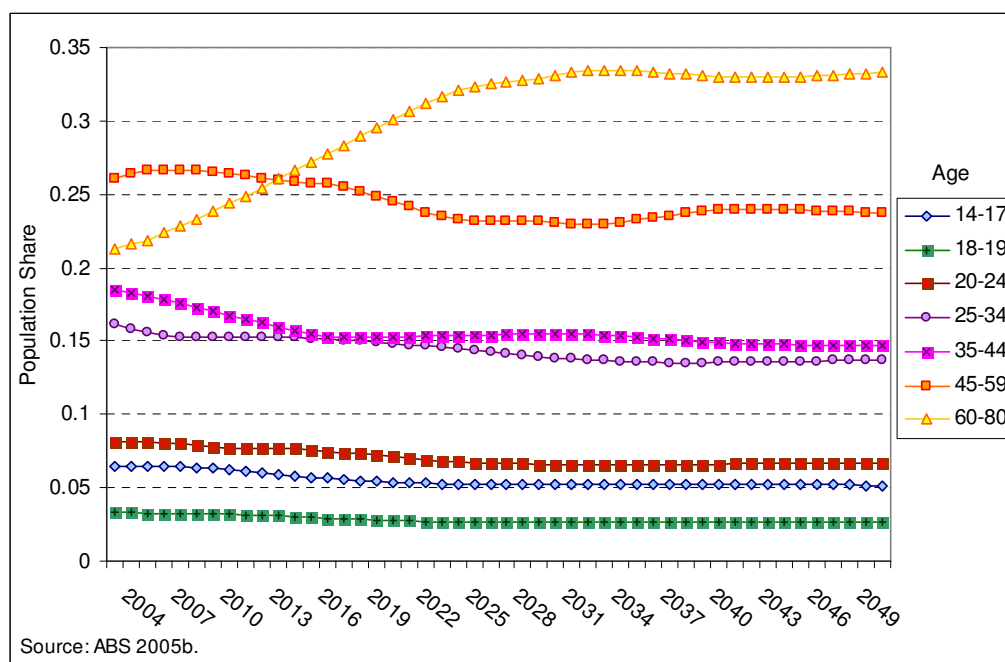


Figure B.6.4: Annual Prospective Change in Age Composition of Female South Australian Population, Females, 2004-2051.

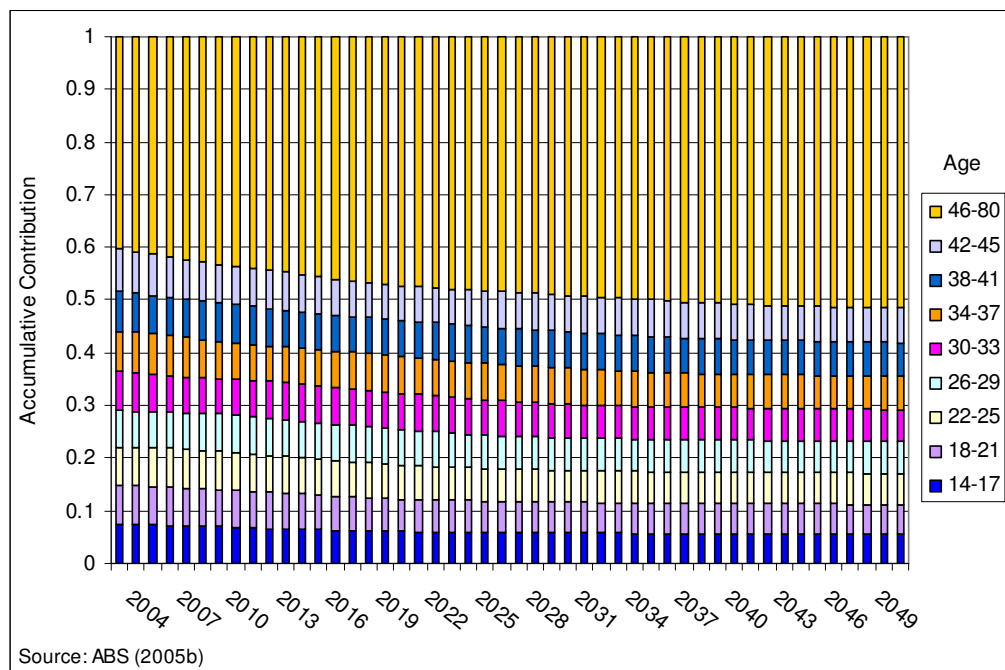


Figure B.6.5: Annual Prospective Age Composition of Male Western Australian Population, 2004-2051.

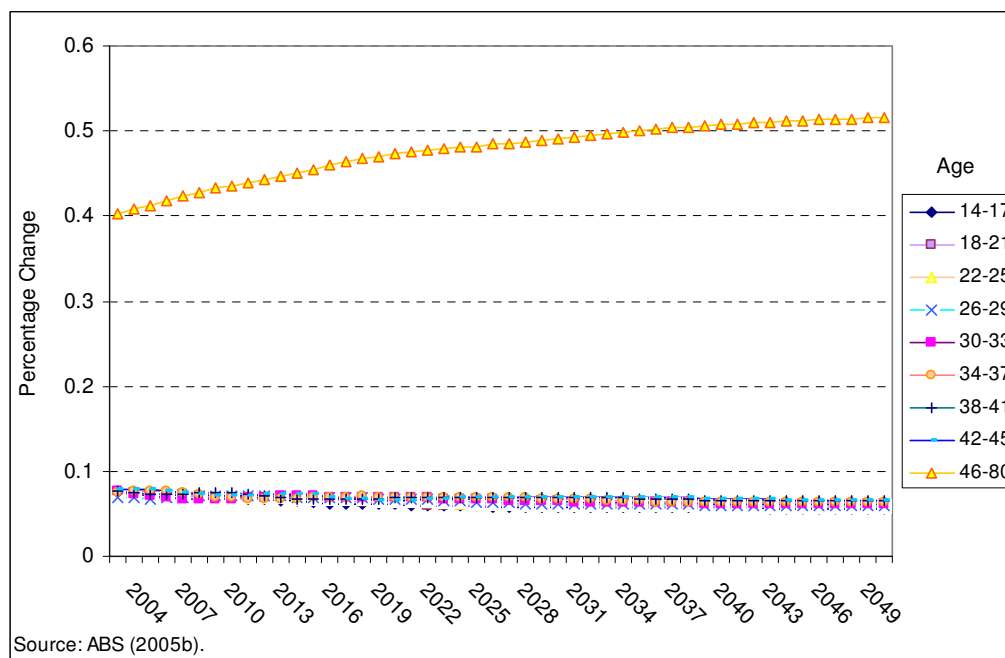


Figure B.6.6: Annual Prospective Change in Age Composition of Male Western Australian Population, 2004-2051.

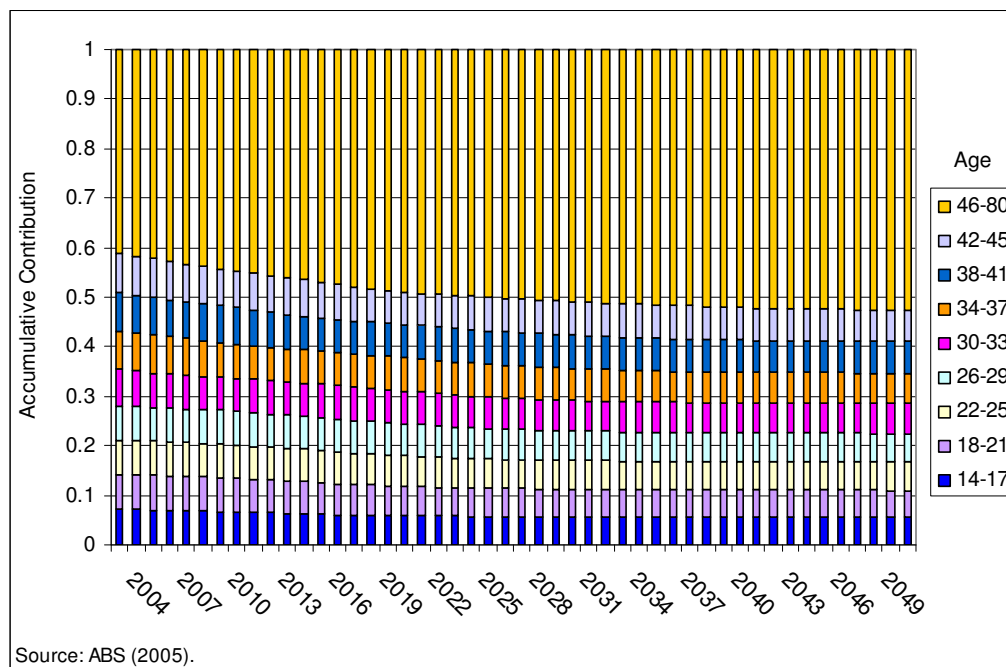


Figure B.6.7: Annual Prospective Age Composition of Female Western Australian Population, 2004-2051.

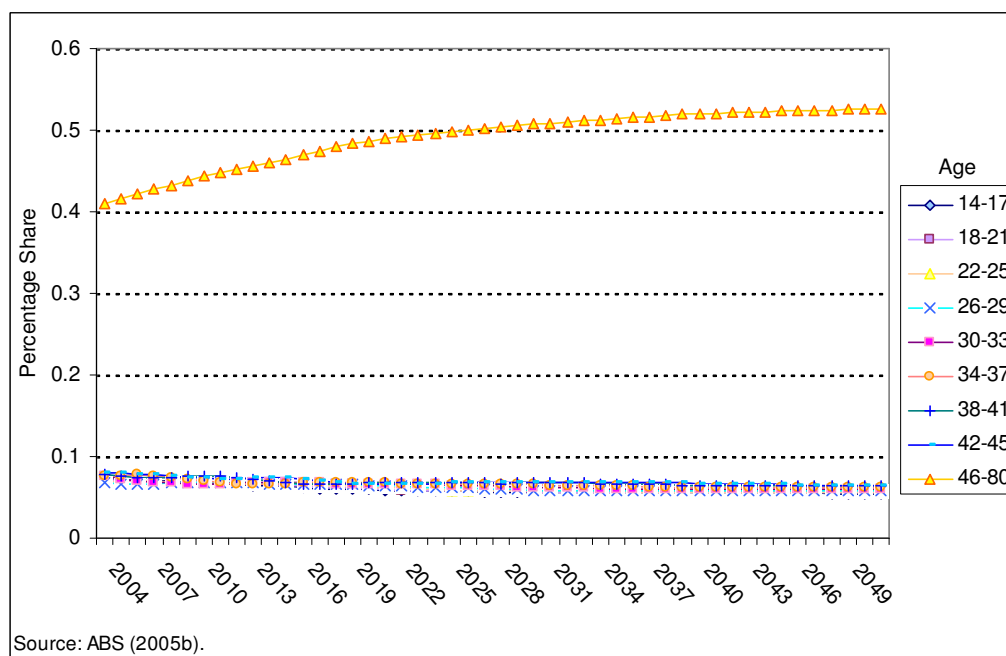


Figure B.6.8: Annual Prospective Change in Age Composition of Female Western Australian Population, 2004-2051.

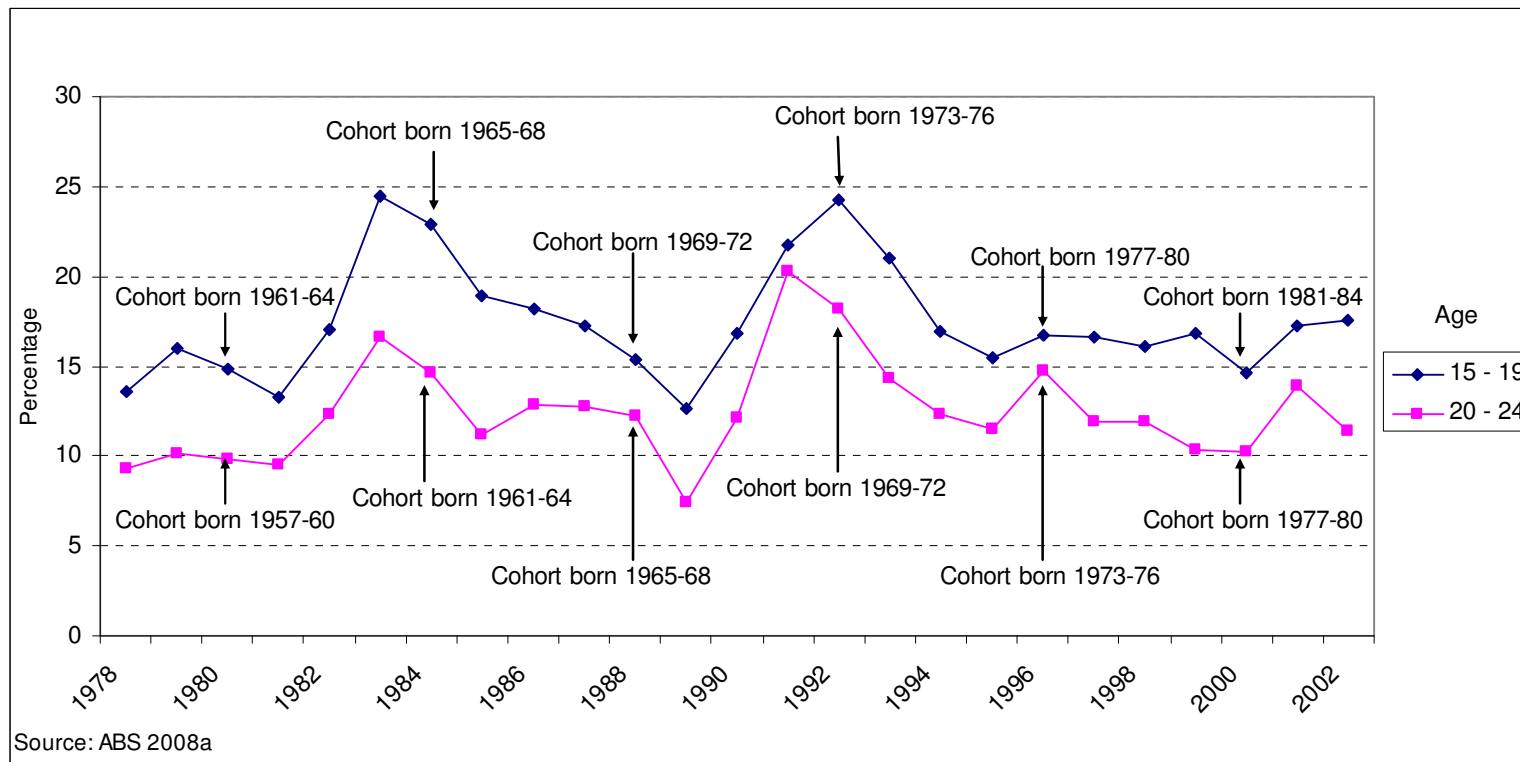


Figure B.7.1: Male Western Australian Unemployment Rates ('000): Annotated for Cohorts at Age 16-19 and 20-23 years, as a Percentage, 1978-2002.

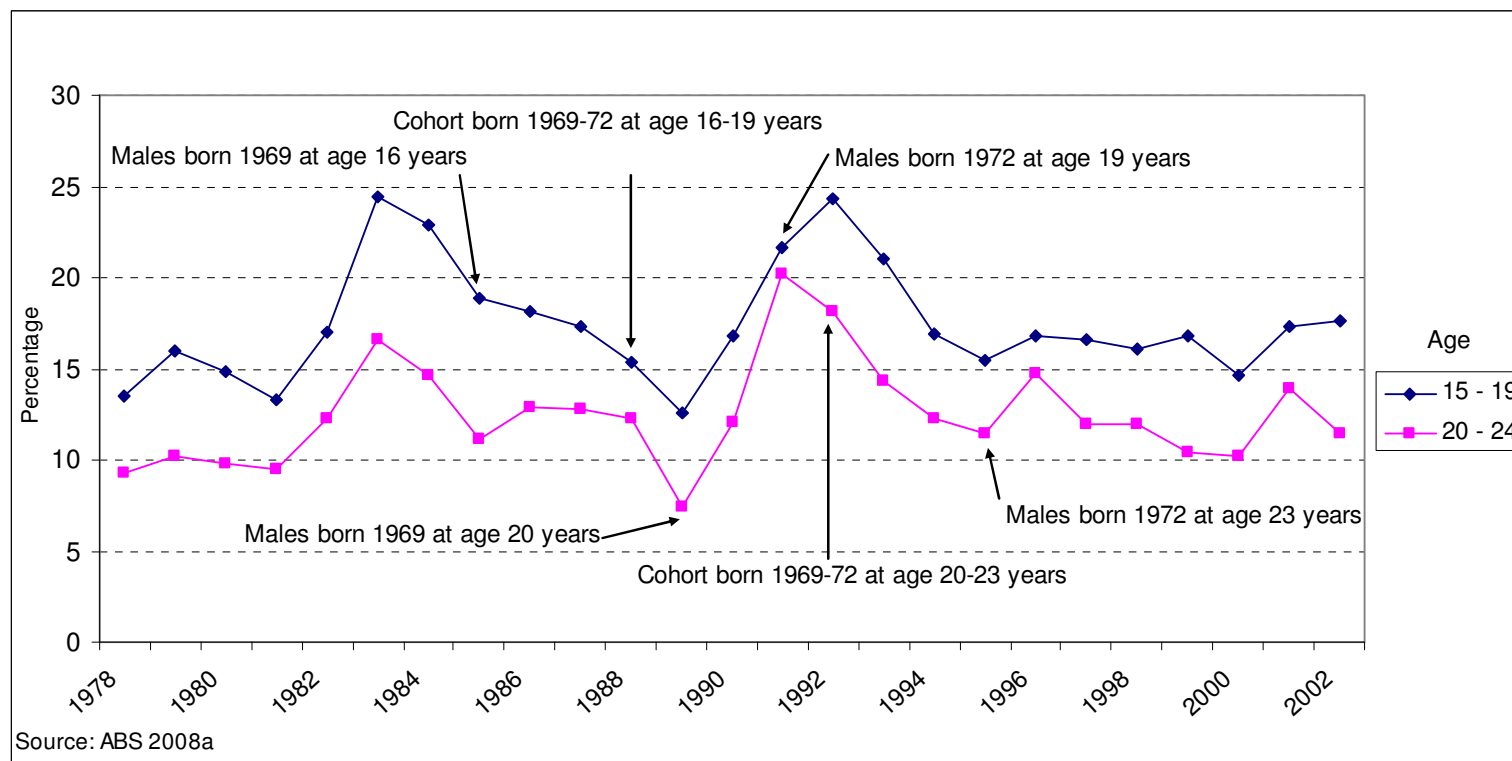


Figure B.7.2: Male Western Australian Unemployment Rates ('000): Annotated for the Cohort Born 1969-72 at Age 16-19 and 20-23 Years, as a Percentage, 1978-2002.

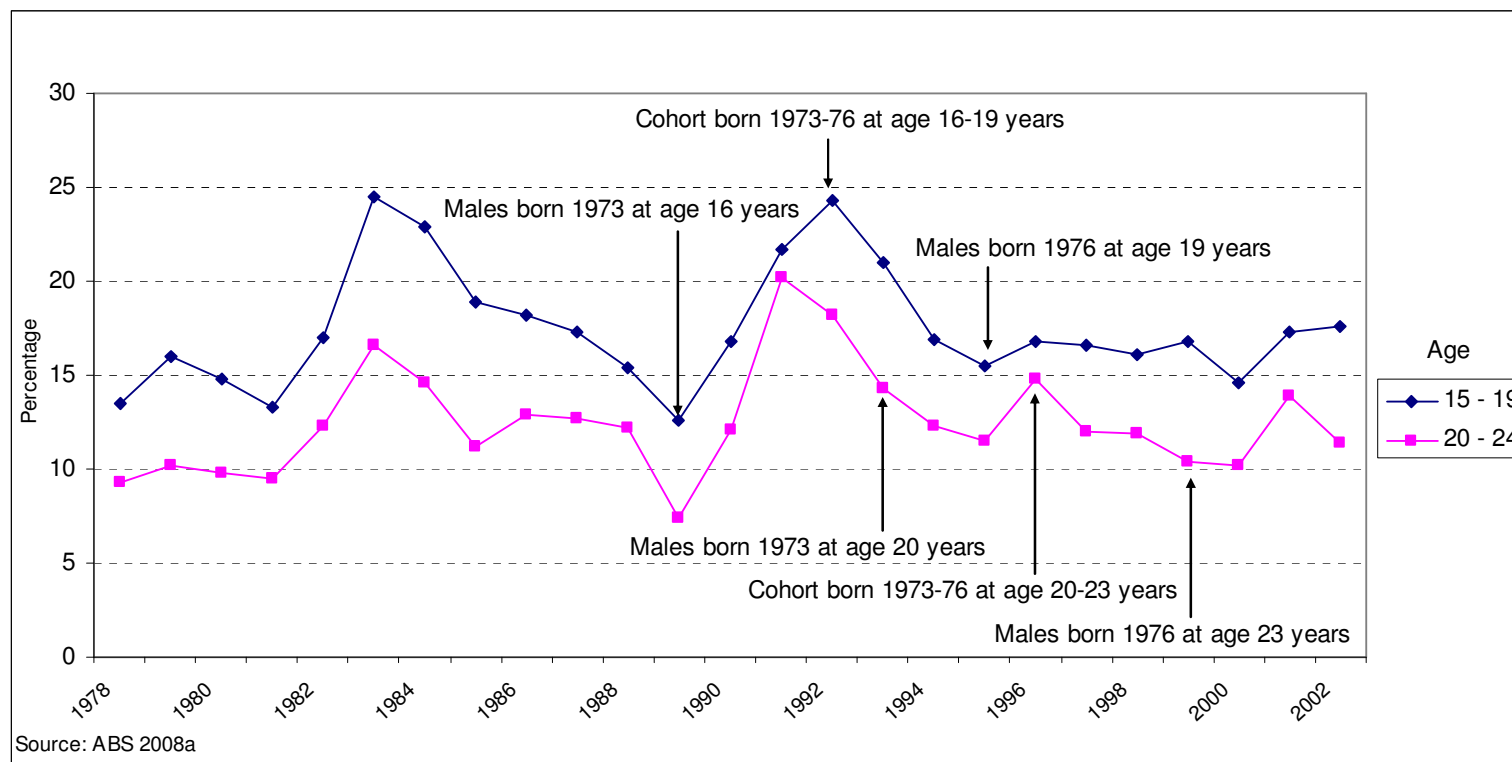


Figure B.7.3: Male Western Australian Unemployment Rates ('000): Annotated for the Cohort Born 1973-76 at Age 16-19 and 20-23 Years, as a Percentage, 1978-2002.

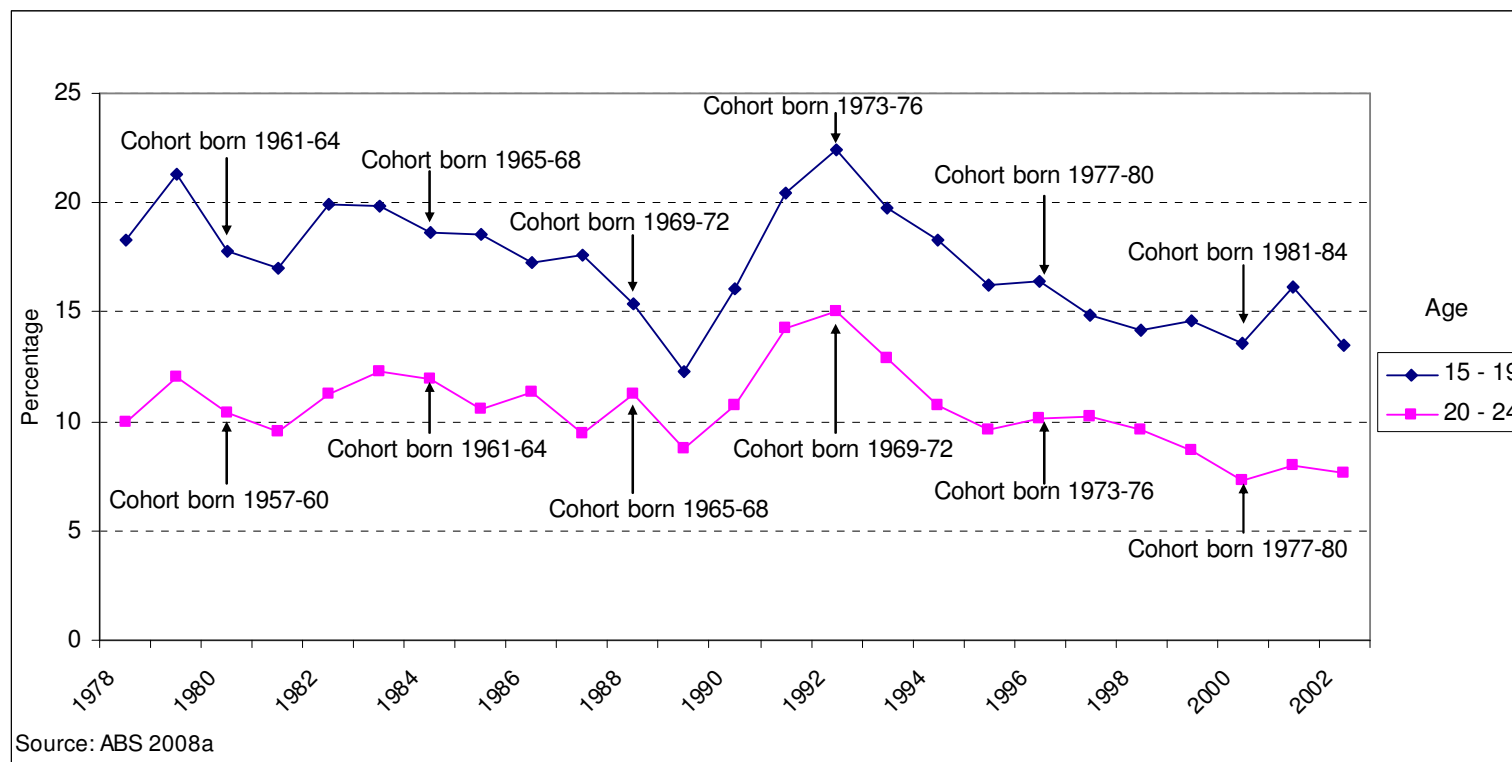


Figure B.7.4: Female Western Australian Unemployment Rates ('000): Annotated for Cohorts at Age 16-19 and 20-23 Years, as a Percentage, 1978-2002.

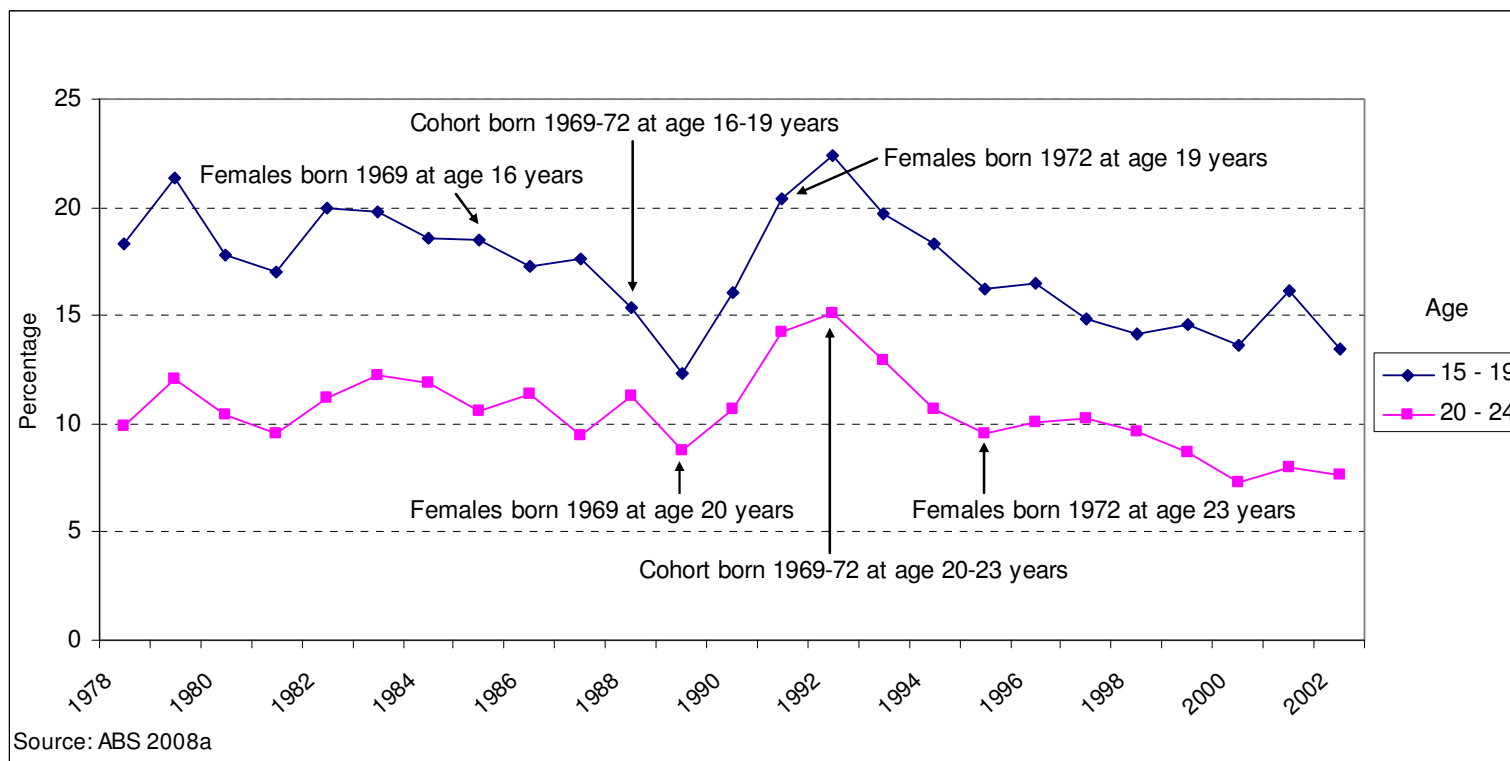


Figure B.7.5: Female Western Australian Unemployment Rates ('000): Annotated for the Cohort Born 1969-72 at age 16-19 and 20-23 Years, as a Percentage, 1978-2002.

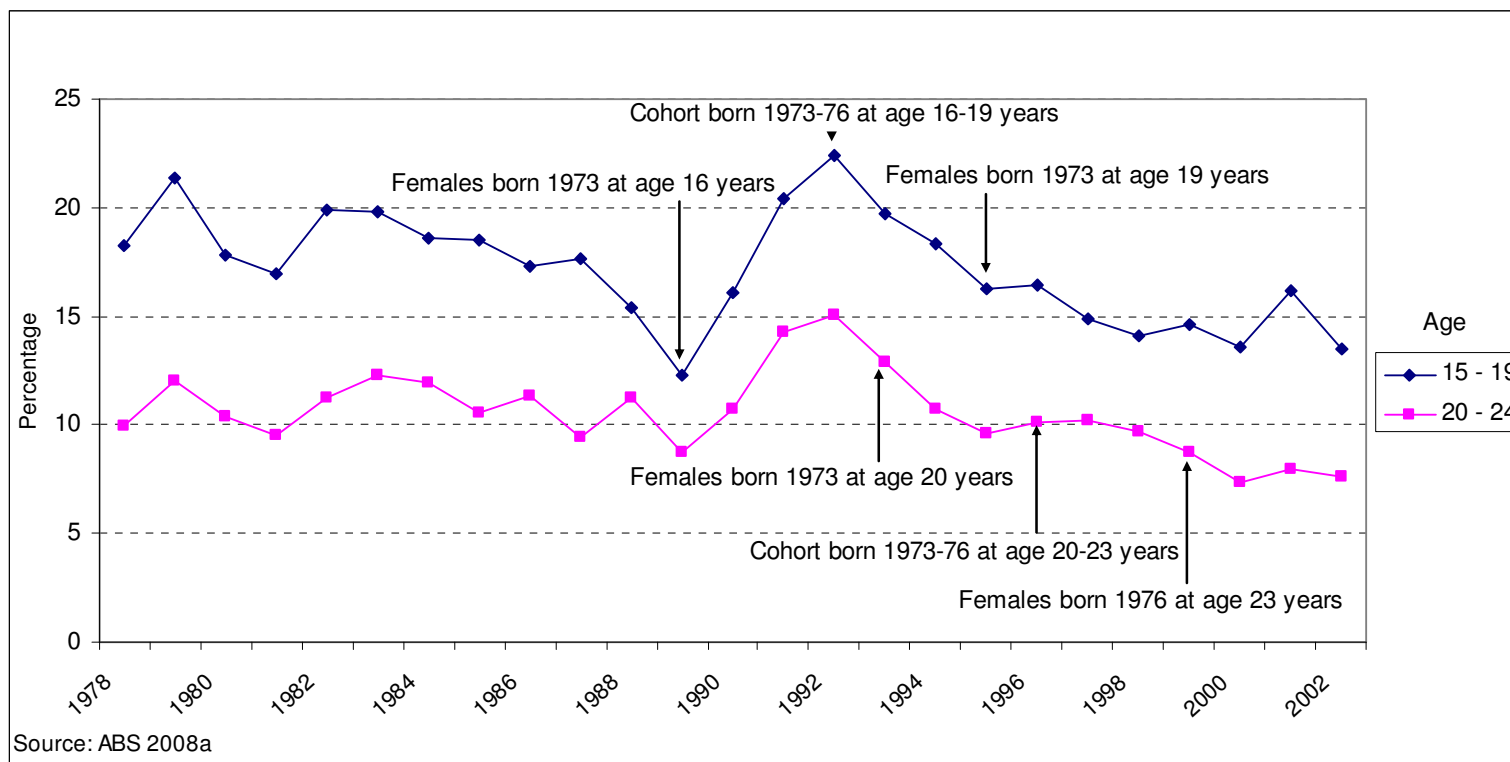


Figure B.7.6: Female Western Australian Unemployment Rates ('000): Annotated for the Cohort Born 1973-76 at Age 16-19 and 20-23 Years, as a Percentage, 1978-2002.

Appendix C – Data Correlated in Chapter Seven

C.1 Change in Population and Offence-Specific Apprehension Share (WA)

Table C.1.1: Offences Against Property, Western Australia 1994-2002, By Age Group (%).

	Change in Population Share			Change in Apprehension Share		
	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	-7.9	0.8	-7.1	-14.4	-16.4	-28.5
22-25	-9.7	-10.4	-19.1	7.3	-15.7	-9.5
26-29	3.2	-13.0	-10.3	3.2	20.5	24.3
30-33	-10.3	1.0	-9.4	20.1	43.8	72.6
34-37	-1.1	-10.2	-11.2	17.5	18.8	39.6
38-41	-1.3	-0.9	-2.2	22.9	7.4	31.9
42-45	0.4	-0.8	-0.4	37.1	35.4	85.7
46-80	6.5	7.4	14.4	8.4	18.4	28.4
Total	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Table C.1.2: Offences Against the Person, Western Australia 1994-2002, By Age Group (%).

	Change in Population Share			Change in Apprehension Share		
	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	-7.9	0.8	-7.1	-13.8	-1.5	-15.2
22-25	-9.7	-10.4	-19.1	-2.3	-19.0	-20.9
26-29	3.2	-13.0	-10.3	2.2	-1.6	0.6
30-33	-10.3	1.0	-9.4	4.2	15.2	20.1
34-37	-1.1	-10.2	-11.2	1.5	-7.9	-6.5
38-41	-1.3	-0.9	-2.2	-0.6	27.0	26.2
42-45	0.4	-0.8	-0.4	12.0	12.7	26.2
46-80	6.5	7.4	14.4	36.3	9.2	48.8
Total	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Table C.1.3: Fraud and Misappropriation, Western Australia 1994-2002, By Age Group (%).

	Change in Population Share			Change in Apprehension Share		
	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	-7.9	0.8	-7.1	2.4	-2.2	0.1
22-25	-9.7	-10.4	-19.1	-23.9	-8.0	-30.0
26-29	3.2	-13.0	-10.3	18.7	1.9	20.9
30-33	-10.3	1.0	-9.4	5.0	3.0	8.2
34-37	-1.1	-10.2	-11.2	-10.1	9.4	-1.7
38-41	-1.3	-0.9	-2.2	27.0	-18.0	4.1
42-45	0.4	-0.8	-0.4	-10.2	20.0	7.8
46-80	6.5	7.4	14.4	18.4	9.4	29.5
Total	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Table C.1.4: Sexual Offences, Western Australia 1994-2002, by Age Group (%).

	Change in Population Share			Change in Apprehension Share		
	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	-7.9	0.8	-7.1	1.6	-6.9	-5.4
22-25	-9.7	-10.4	-19.1	-10.2	10.0	-1.2
26-29	3.2	-13.0	-10.3	13.2	-29.0	-19.6
30-33	-10.3	1.0	-9.4	-2.2	10.6	8.1
34-37	-1.1	-10.2	-11.2	1.2	-28.2	-27.3
38-41	-1.3	-0.9	-2.2	10.6	20.1	32.9
42-45	0.4	-0.8	-0.4	-8.9	-5.1	-13.6
46-80	6.5	7.4	14.4	-3.0	21.5	17.9
Total	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

Table C.1.5: Robbery and Extortion, Western Australia 1994-2002, by Age Group (%).

	Change in Population Share			Change in Apprehension Share		
	1994-1998	1998-2002	1994-2002	1994-1998	1998-2002	1994-2002
18-21	-7.9	0.8	-7.1	20	-14	2.7
22-25	-9.7	-10.4	-19.1	-15	-14	-27.5
26-29	3.2	-13.0	-10.3	23	-25	-8.5
30-33	-10.3	1.0	-9.4	-66	189	-0.5
34-37	-1.1	-10.2	-11.2	36	209	320.0
38-41	-1.3	-0.9	-2.2	-35	61	5.0
42-45	0.4	-0.8	-0.4	-18	243	180.0
46-80	6.5	7.4	14.4	145	-57	5.0
Total	...	...	...	...	...	...

Source: Calculated by author from ABS (2005a), CRC (1995-2003).

C.2 Change in Population and Offence-Specific Apprehension Share (SA)

Table C.2.1: Offences Against Property, South Australia 1987-1997 and 1998-2004, by Age Group (%).

	Change in Population Share		Change in Apprehension Share	
	1987-1997	1998-2004	1987-1997	1998-2004
18-19	-2.2	1.1	-0.2	-2.1
20-24	-1.7	-0.1	0.9	-1.3
25-34	-1.1	-1.9	4.0	0.0
35-44	0.5	-0.8	6.4	7.5
45-59	1.9	1.8	-2.2	9.1
60-80	0.2	0.4	-5.8	-3.5
Total	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

Table C.2.2: Offences Against the Person, South Australia 1987-1997 and 1998-2004, by Age Group (%).

	Change in Population Share		Change in Apprehension Share	
	1987-1997	1998-2004	1987-1997	1998-2004
18-19	-2.2	1.1	-2.0	-0.7
20-24	-1.7	-0.1	-2.6	-0.1
25-34	-1.1	-1.9	1.6	-1.3
35-44	0.5	-0.8	4.1	2.3
45-59	1.9	1.8	3.7	1.7
60-80	0.2	0.4	-0.1	3.0
Total	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

Table C.2.3: Fraud and Misappropriation, South Australia 1987-1997 and 1998-2004, by Age Group (%).

	Change in Population Share		Change in Apprehension Share	
	1987-1997	1998-2004	1987-1997	1998-2004
18-19	-2.2	1.1	-4.6	-0.1
20-24	-1.7	-0.1	0.3	-5.0
25-34	-1.1	-1.9	1.2	0.3
35-44	0.5	-0.8	1.7	5.9
45-59	1.9	1.8	7.7	0.5
60-80	0.2	0.4	1.9	23.5
Total	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

Table C.2.4: Sexual Offences, South Australia 1987-1997 and 1998-2004, by Age Group (%).

	Change in Population Share		Change in Apprehension Share	
	1987-1997	1998-2004	1987-1997	1998-2004
18-19	-2.2	1.1	-3.7	-1.2
20-24	-1.7	-0.1	-0.8	-1.2
25-34	-1.1	-1.9	-1.1	-1.8
35-44	0.5	-0.8	1.3	-3.2
45-59	1.9	1.8	5.1	3.4
60-80	0.2	0.4	1.8	10.0
Total	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.

Table C.2.5: Robbery and Extortion, South Australia 1987-1997 and 1998-2004, by Age Group (%).

	Change in Population Share		Change in Apprehension Share	
	1987-1997	1998-2004	1987-1997	1998-2004
18-19	-2.2	1.1	-1.8	-1.9
20-24	-1.7	-0.1	-2.3	-0.3
25-34	-1.1	-1.9	0.5	11.7
35-44	0.5	-0.8	4.2	14.8
45-59	1.9	1.8	2.9	-2.3
60-80	0.2	0.4	0.0	0.0
Total	...	...	...	...

Source: Calculated by author from ABS (2005a) and OCSAR (1988-2005).

Note: Due to different counting rules applied by OCSAR (1988-2005) for the 1987-97 and 1998-2004 periods, results for these two periods are not directly comparable. Change (%) has been annualised to account for differences in the number of intervals between the 1987-1997 and 1998-2004 periods.